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PHASE I MARINE ARCHEOLOGICAL REMOTE SENSING SURVEY OF THE BARATARIA PASS, OCEAN DREDGE MATERIAL DISPOSAL SITE, JEFFERSON PARISH, LOUISIANA

FINAL REPORT
APRIL 2001

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

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13. ABSTRACT *(Maximum 200 words)*

This report presents the results of Phase I marine archeological remote sensing survey of the Barataria Pass Ocean Dredged Material Disposal Site (ODMDS), in Jefferson Parish, Louisiana. This investigation was conducted in November 1999, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). This study was undertaken to assist the USACE-NOD in completing its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended, prior to additional disposal of dredged material at this location. All aspects of the investigations were completed in accordance with the Scope-of-Work and the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48, No. 190, 1983). The study area for this project consisted of a single survey block comprising the entire ODMDS, which is located at the southern entrance of the Barataria Pass. The survey block measures approximately 2,538.2 ft (773.7 m) x 19,776.5 ft. (6029.4 m), for a total of 1,152.4 acres with the study area.

The objectives of this study were to identify specific targets that might represent significant submerged cultural resources within the project area, and to provide the USACE-NOD with management recommendations for such resources. These objectives were met through implementation of a research design that combined background archival investigations, marine archeological remote sensing survey, and technical report preparation.

Background research and archival investigations indicated a low to moderate potential for encountering submerged historic cultural resources within the project area. A review of Louisiana archeological site files and relevant research reports documented no underwater sites within a mile (1.6 km) radius of the project area. A review of Louisiana's shipwreck database, the National Oceanic and Atmospheric Administration's (NOAA) Automated Wreck and Obstruction Information System (AWOIS), and several secondary sources yielded information only on one wrecking incident in Jefferson Parish.

Archeological investigations consisted of a controlled marine remote sensing survey of approximately 108.6 linear miles (174.8 km) of ocean bottom. This survey utilized a differential global positioning system (DGPS); a digital recording side scan sonar; a recording proton precession magnetometer; and, hydrographic navigational computer software. The survey was conducted with a lane spacing of 100 ft (30.48 m) to ensure the greatest detail in coverage, assuring that any abandoned or wrecked historic vessels in the survey area would be detected.

The marine remote sensing survey registered a total of 163 individual magnetic anomalies, and 17 acoustic anomalies. From these anomalies, 25 target clusters were identified. Two of these targets may represent significant cultural resources or shipwrecks (Targets 6 and 19), and two other targets may represent cable or pipeline segments (Targets 14 and 18). In lieu or avoidance, it is recommended that further study of Targets 6 and 19 be undertaken to evaluate their significance applying the National Register Criteria. Targets 14 and 18 should be reviewed by USACE-NOD personnel to determine the efficacy of dredge material deposition there; however, they are not significant cultural resources. The remaining targets likely represent areas of scattered modern debris; no further study of these targets is recommended.

14. SUBJECT TERMS
marine archeological remote sensing survey of the Barataria Pass Ocean Dredged Material Disposal, ODMDS, Section 106, National Historic Preservation Act of 1966, *Guidelines for Archeology and Historic Preservation,* Louisiana archeological site files, AWOIS, differential global positioning system, side scan sonar, proton precession magnetometer

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Special thanks are also due to the staffs of the following repositories: The Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Divisions of Archaeology and Historic Preservation; the Howard-Tilton Memorial Library at Tulane University; and the Library of Allan Green, Hammond, Louisiana. Particular thanks are extended to Mr. Steven Very of NOAA for providing a prompt response to our request for information from the Automated Wreck and Obstruction Information System.

R. Christopher Goodwin, Ph.D., served as Principal Investigator for this project. Mr. Jean B. Pelletier, M.A., served as Project Manager, and directed all aspects of data collection. He was assisted by Nautical Archeologists Larkin A. Post, B.A., and Sarah A. Milstead, B.A.; and Remote Sensing Specialists David Trubey, B.A., Carrie Sowden, B. S., and Douglas Jones, B.A. Richard Vidutis, Ph.D., served as project historian. Graphics were prepared by Barry Warthen, David Olney, B.A., Sarah A. Milstead, B.A. and Jean B. Pelletier, M.A. The report was produced by Ms. Stacy Beitz and Ms. Sharon Little.

PHASE I MARINE ARCHEOLOGICAL REMOTE SENSING SURVEY OF THE BARATARIA PASS, OCEAN DREDGE MATERIAL DISPOSAL SITE, JEFFERSON PARISH, LOUISIANA

FINAL REPORT

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PRINCIPAL INVESTIGATOR

BY

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CHAPTER I

INTRODUCTION

This report presents the results of Phase I marine archeological remote sensing survey of the Barataria Pass, Ocean Dredged Material Disposal Site (ODMDS), in Jefferson Parish, Louisiana (Figures 1 and 2). The investigations were conducted during November, 1999, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD), in support of the proposed dredging of the bar channel reach of the Barataria Bay Waterway and subsequent disposal of dredge material at this location. Use of this area as a dredge material disposal site has occurred sporadically since 1960.

In keeping with the New Orleans District's mission to preserve, document, and protect significant cultural resources, magnetic and acoustic remote sensing survey was undertaken to locate potential archeological remains, and in so doing, to assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended. All aspects of these investigations were completed in full compliance with the Scope-of-Work; with 36 CFR 800, "Protection of Historic Properties;" with the Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101 – 2106); with Abandoned Shipwreck Guidelines, National Park Service; with National Register Bulletins 14, 16, and 20; with 36 CFR 66; and, with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48, No 190, 1983).

The survey area for this project consisted of one continuous survey block measuring approximately 2,538.2 ft (773.7 m) wide by 19,776.5 ft (6,029.4 m) long. In total, approximately 108.6 linear miles (174.8 km) of ocean bottom were surveyed. The survey area (and the ODMDS zone) are delineated by the following coordinates:

NW Corner
29° 16'10" N x 89° 56'20"W
NE Corner
29° 14'19" N x 89° 53'16" W
SW Corner
29° 16'29" N x 89° 55'59" W
SE Corner
29° 14'00" N x 89° 53'36"W

Research Objectives and Design

The objectives of the Barataria Pass ODMDS remote sensing survey were to identify all submerged and visible watercraft and other maritime related cultural resources in the ODMDS project area; to assess, whenever possible, the National Register of Historic Places (NRHP) eligibility of identified resources, applying the Criteria for Evaluation (36 CFR 60.4 [a-d]; and, to provide the USACE-NOD with management recommendations for such resources. These objectives were addressed through a combination of archival research and field survey. The background study and history of the project area were researched through examination of State of Louisiana archeological site files, local historical reference files, previous cultural resources

investigations conducted in the vicinity of the project area, historic maps, relevant primary map and microfilm records, and secondary literature.

Field survey of the project area was conducted from a 52 ft crew boat leased from Kevin Gros Consulting and Marine Services, Inc. of Larose, Louisiana. The project area was divided into 29 parallel track lines or transcects spaced at 100 ft (30.7 m) intervals. The equipment array used for the Barataria Pass ODMDS survey included a DGPS, a proton precession marine magnetometer, side scan sonar, and a fathometer. Data were collected and correlated by a laptop computer using hydrographic survey software. Data were inventoried, post-processed, and analyzed to identify specific targets within the project area that might represent significant submerged cultural resources.

The marine remote sensing survey registered a total of 163 individual magnetic anomalies, and 17 acoustic anomalies. From these anomalies, 25 target clusters were identified. Two of these targets may represent possible significant cultural resources or shipwrecks (targets 6 and 19) and two other targets may represent cable or pipeline segments (targets 14 and 18). In lieu or avoidance, RCG&A are recommending further study of these four targets. The remaining targets likely represent areas of scattered modern debris and RCG&A recommend no further study of these targets.

R. Christopher Goodwin, Ph.D., served as Principal Investigator for this project. Mr. Jean B. Pelletier, M.A., served as Project Manager and Lead Nautical Archeologist; he directed in-field data collection and its subsequent analysis, with the assistance of Remote Sensing Specialists and Nautical Archeologists Larkin A. Post, David W. Trubey, and Sarah A. Milstead. Captain Denis Debou operated the survey vessel.

Organization of the Report

This report develops the natural and historical contexts of the project area as the basis for analysis and interpretation. The geological and prehistoric settings of the project area are discussed in Chapter II. Chapter III places the project area within its historic context, and develops an historic-chronological framework for retrodiction and subsequent evaluation of classes of submerged historic resources, particularly shipwrecks. Chapter IV reviews research methods and sources used during archival research, and the instrumentation and methods employed during field survey. Chapter V presents previous investigations in the vicinity of the project area, Chapter VI discusses the results of the archival research effort, and Chapter VII presents the remote sensing survey results. A summary of the study and management recommendations are provided in Chapter VIII.

Appendix I contains the Scope-of-Work for this project; Appendix II contains curriculum vitae for key project personnel.

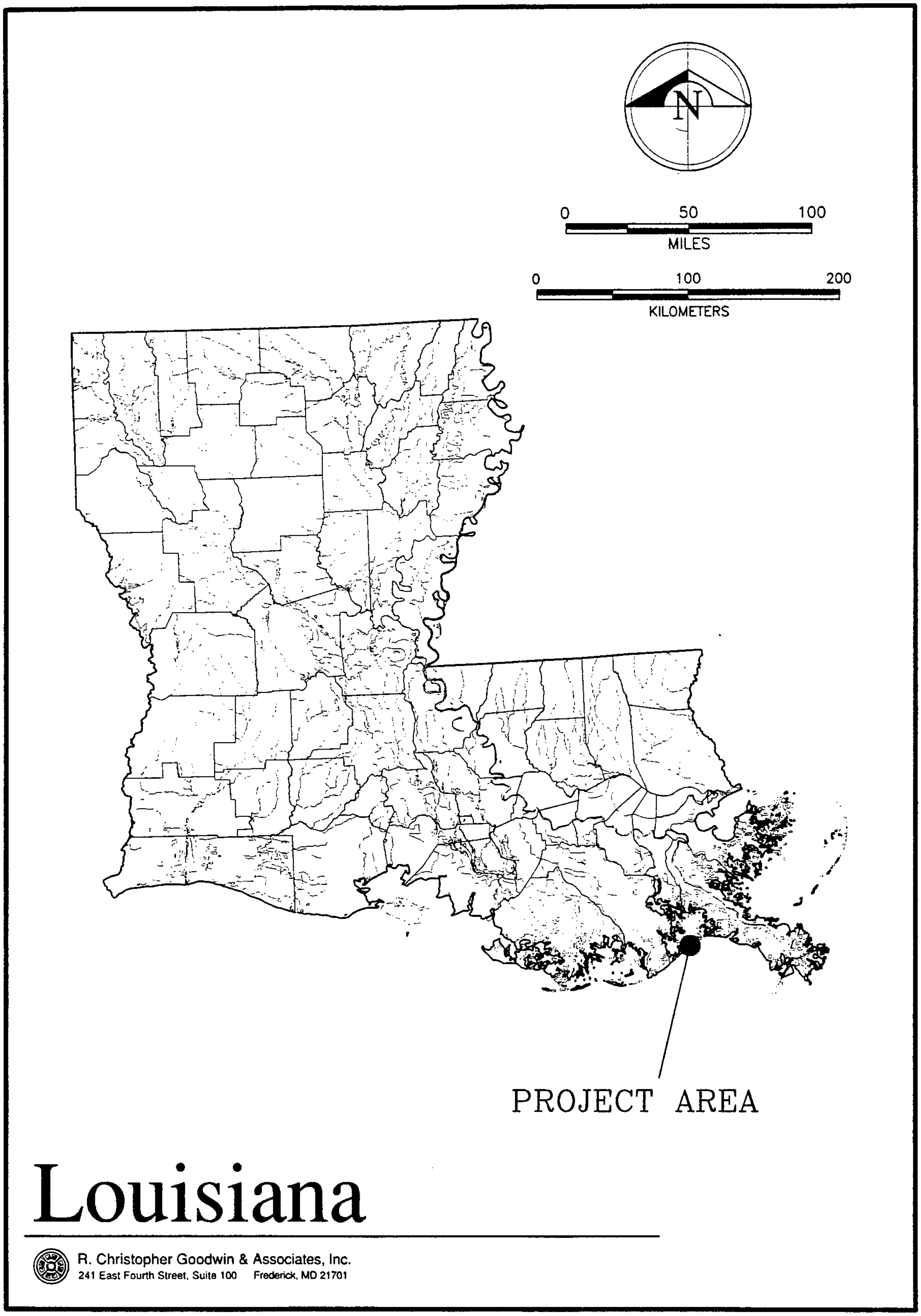

Figure 1. Map of Louisiana with project location marked

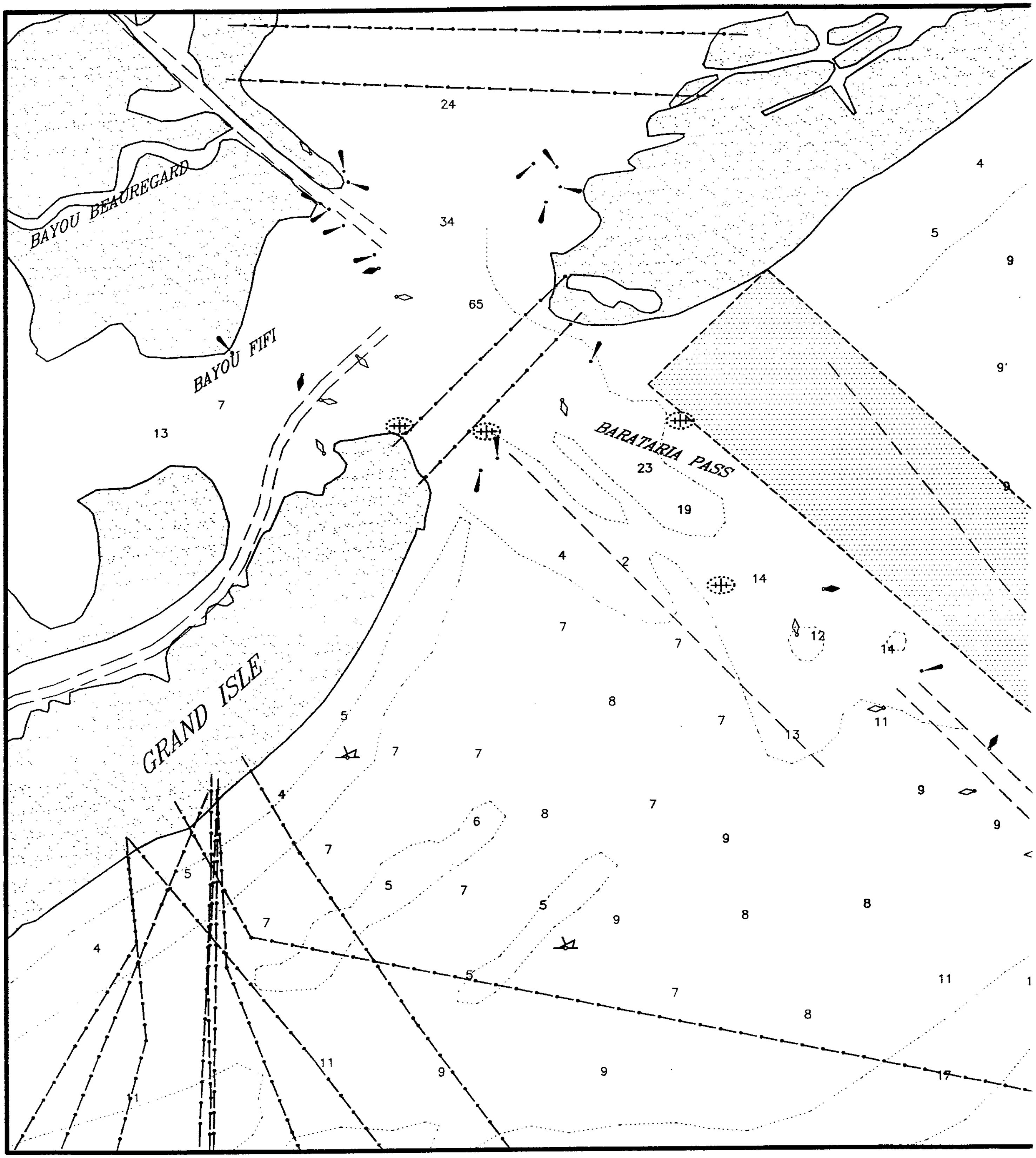

Figure 2. Map of Survey Area in Barataria Pass

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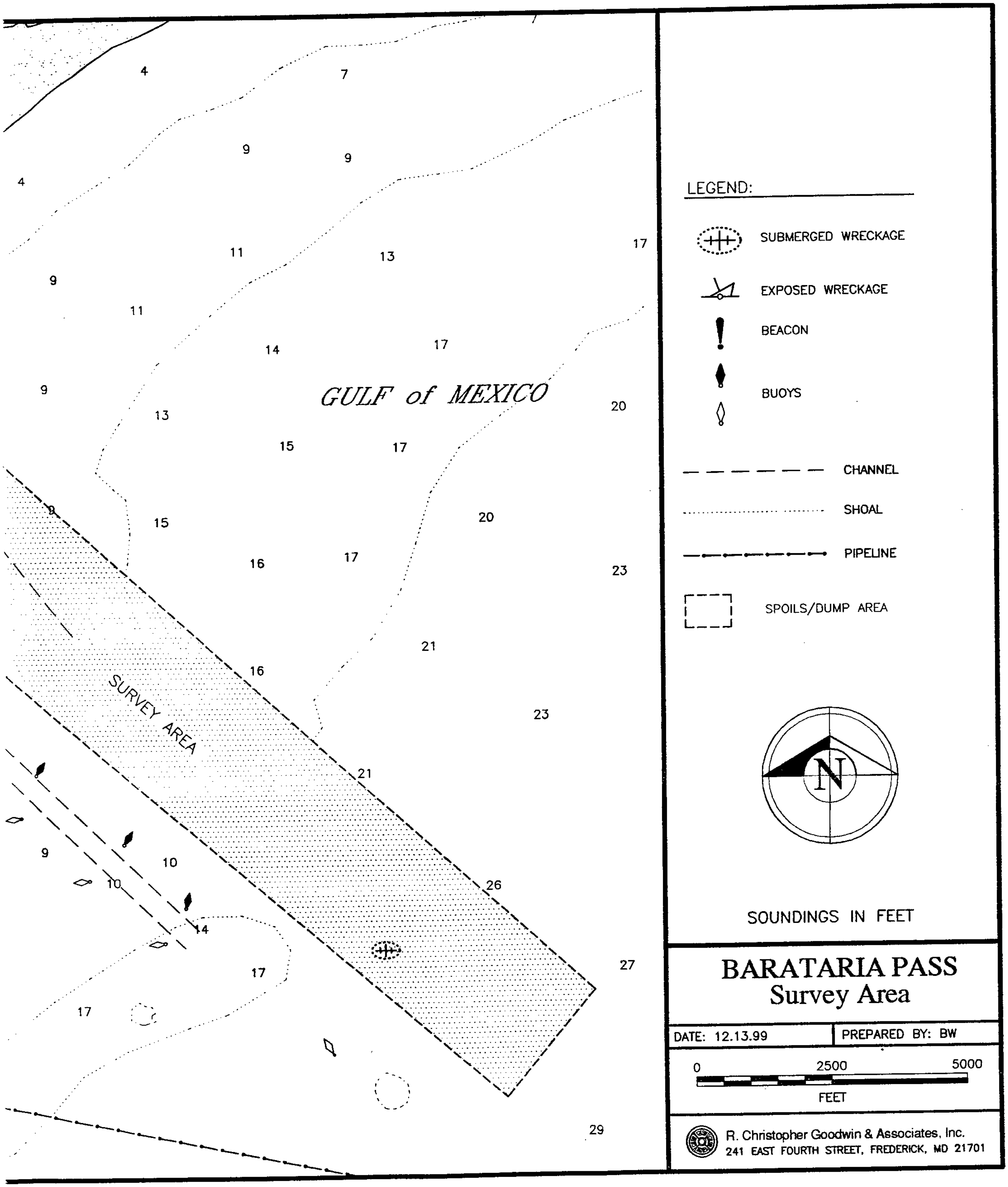
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CHAPTER II

GEOMORPHIC DEVELOPMENT AND HISTORY OF THE BARATARIA PASS, ODMDS AREA

Purpose and Scope

This chapter is concerned with the geologic setting and geomorphic processes of an area offshore from Barataria Pass in southeastern, coastal Louisiana that was used for the disposal of dredged material generated by construction of the Barataria Bay Waterway approach channel. The chapter provides insight into aspects of physiography, sedimentation, and stratigraphy as related to cultural resources that might have been impacted by offshore dredged material disposal.

The unique scientific, economic, and social importance of the Mississippi River deltaic plain has prompted a considerable amount of detailed investigation over many decades related to its origin and physical processes. While there is an appreciable body of published literature on the region, only a few studies have been conducted of the project vicinity. They form the basis of the present chapter, and are cited in the text.

Geographic and Physiographic Settings

The Mississippi River deltaic plain forms a substantial part of southeastern Louisiana. It is defined by the extent of deltaic distributaries and intratidal wetlands of the present and abandoned delta lobes (subdeltas). Along the coast, it also includes features and areas where deltaic deposits have been reworked by marine processes, such as barrier islands. Barataria Pass, formerly known as Grand Pass, lies between the barrier islands of Grand Isle on the west and the westernmost of three islands that form the Grand Terre complex on the east (Figure 3). It is located in extreme southeastern Jefferson Parish, LA, about 75 km (47 mi) south of New Orleans and about 72 km (45 mi) west of the active mouth of the Mississippi River (Head of Passes).

Grand Isle is essentially coincident with the community of Grand Isle, one of the very few permanently occupied communities on or within a few kilometers of the Gulf shoreline in Louisiana. The town has a permanent population of about 1,500, most of whom are employed in the tourism, seafood, and oilfield industries. Seasonally, the population may swell to several times that number. On the other hand, the western island of the Grand Terre complex (herein referred to simply as Grand Terre) is occupied only by a small marine research laboratory and the historic Fort Livingston on its western end. Grand Isle is accessible by road, whereas Grand Terre is accessible only by boat.

Both Grand Isle (about 12 km [7.5 mi] long), and Grand Terre (about 4.5 km [2.8 mi] long), are linear features that trend northeast-southwest. They serve to separate the large, estuarine Barataria Bay to the north from the Gulf of Mexico to the south (Figure 3). Barataria Bay occupies the southern end of a large interdistributary (interlobe) basin that lies between the modern meander belt of the Mississippi River on the east and the major, abandoned Bayou Lafourche distributary on the west (Kosters 1989).

Both Grand Isle and Grand Terre are low, slightly undulating, sandy islands with maximum natural elevations only 1.8 to 2.1 m (6 to 7 ft) above sea level (NGVD) (Conatser 1969). Basically, three types of terrain exist on the islands—an active beach with dunes, a zone of beach ridge accretion and washover deposits, and a bay-side zone of intratidal wetlands. These are discussed in more detail later. These terrains are most evident on Grand Terre and have been almost obliterated on Grand Isle due to urbanization and industrialization. The beach and seaward margins of Grand Isle also have been heavily modified by artificial beach nourishment, groins constructed to trap longshore sediment drift, and a jetty constructed at the east end of the island in 1958 (Penland *et al.* 1986).

Barataria Bay is a very shallow brackish-water body with a mean depth of only about 3.1 m (5 ft), and scattered small islands of vegetated wetlands. Offshore from the barrier islands, water depths gradually increase seaward, reaching a depth of 11.2 m (18 ft) about 3 km (1.8 mi) from shore. Barataria Pass functions to accommodate tidal flow between the bay and the Gulf. Although the normal lunar tidal range is only about 0.34 m (1.1 ft), it can be significantly augmented by wind tides, and strong tidal currents occur frequently. The currents have scoured a deep natural channel in Barataria Pass (Figure 4). While the pass is about 1 km (0.6 mi) wide between the islands, the channel is about 0.5 km (0.3 mi) wide and can be traced as a bathymetric depression for about 6 to 7 km (3.7 to 4.3 mi). The channel has been reported as being as deep as 140 ft (42.7 m), but it fluctuates between 60 and 160 ft (18.2 and 48.8 m) according to Conatser (1971). Ebb and flood tidal deltas have formed at the ends of the scoured channel in the Gulf and bay, respectively.

Along this portion of the Gulf Coast, the *longshore* currents dominantly are from the east. However, due to prevailing south and southeast winds interacting with the northeast-trending shoreline, the *littoral* current is from the southwest. Waves typically are only about 0.3 to 0.6 m (1.0 to 2.0 ft) high but can reach 1.2 to 1.5 m (4.0 to 5.0 ft) high in local storms. During severe hurricanes such as Betsy in 1965, Grand Isle was completely inundated by a storm surge that reached a height of 2.7 m (8.8 ft) (Conatser 1971).

The dredged material disposal area surveyed in this project lies about 0.9 km (0.6 mi) offshore from Grand Terre, and immediately east of the dredged waterway approach channel that trends into the pass from the southeast. It is roughly square in shape and involves an area of about 10 sq km (4 sq mi).

Geologic Setting

The Mississippi River deltaic plain is situated in the Gulf segment of the Coastal Plain province of North America. It is a broad, low-lying tract of alluvial land entirely of Holocene age, and nowhere more than a few thousand years old. Geologically, it overlies the northern portion of the east-west trending Gulf basin, a deep structural trough where the continental crust (Paleozoic basement rocks) has been depressed and where mostly unconsolidated sediments of fluvial, estuarine, and marine origin have accumulated to a thickness of tens of thousands of meters. The northern flank of the Gulf Basin is characterized by prevailing subsidence, east-west trending zones of active faults, and the diapiric intrusion of salt to form piercement-type salt domes (Murray 1961).

More specifically, the Mississippi River deltaic plain is the surface manifestation of a relatively thin, seaward thickening prism of Holocene deltaic and shallow marine deposits that overlies Pleistocene deposits of similar origin and still older ones with depth (Kolb and VanLopik 1958). The depth to the top of Pleistocene-age formations in the Barataria Pass area has not been ascertained with accuracy. They were encountered at a depth of 97.5 m (320 ft) below sea level in a boring on the western end of Grand Isle, and at 108.2 m (355 ft) at the eastern end of Grand Terre. Both Conatser (1971) and Saucier (1994) *estimate* a depth of about 113 to 122 m (370

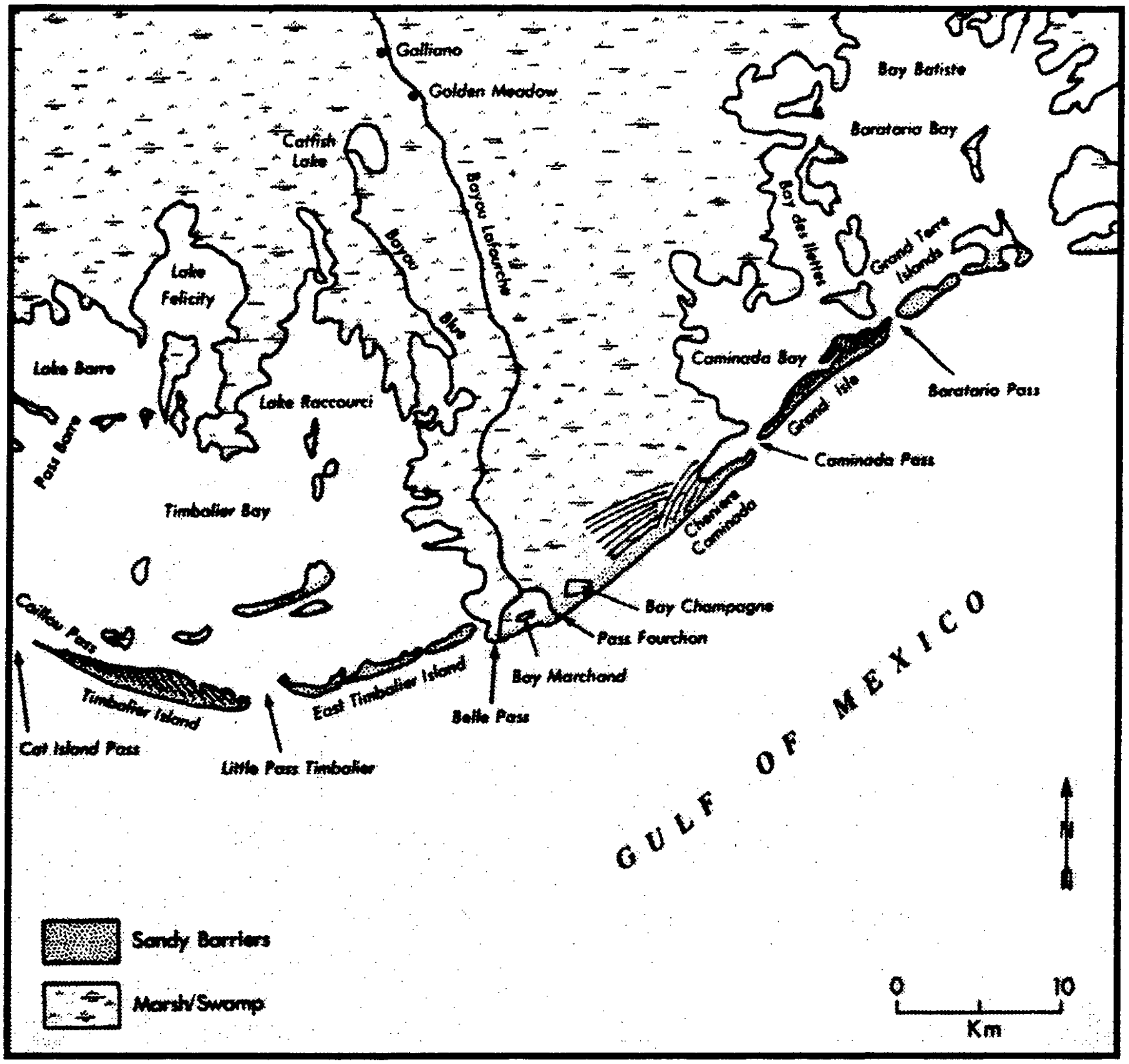


Figure 3. Location of the project area in relation to principal geographic features and basic environments of deposition. From Penland and Boyd (1985)

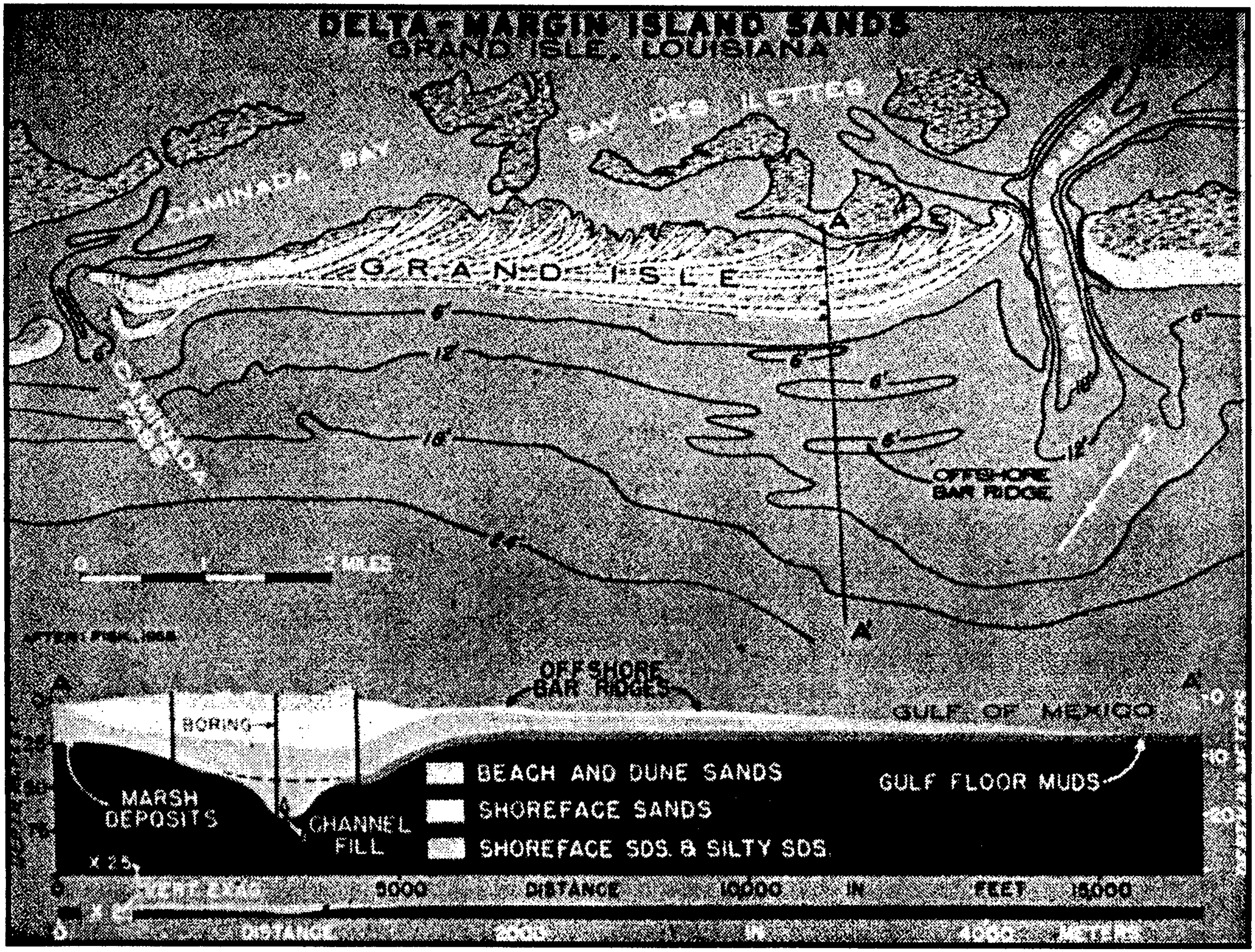


Figure 4. Distribution of surficial features and shallow subsurface sedimentary units of Grand Isle and vicinity. From Fisk (1956)

to 400 ft) for the Pleistocene surface at the pass area based on regional contouring.

Geologic Controls

Geologic controls affecting the Holocene deltaic plain involve two prevailing, regional, and interrelated processes: subsidence and sea level rise. These processes are integral factors in the major cyclical landscape and environmental changes that have taken place in this dynamic deltaic plain setting.

For more than a century, it has been realized that Mississippi River deltaic plain landforms, as well as the structures and facilities built on them by humans (in both prehistoric and historic times), were sinking at a rapid rate not only in geological time frames but in historical time frames, as well. Geologically, the process has come to be known as subsidence, and it involves five basic factors or natural processes (Kolb and VanLopik 1958). Subsidence can be defined simply as the relative lowering of the land surface with respect to sea level and may involve a) true or actual sea level rise, b) sinking of the basement (Paleozoic) rocks due to crustal processes, c) consolidation of the thousands of meters of sediments in the Gulf Basin, d) local consolidation of nearsurface deposits due to desiccation and compaction, and, e) tectonic activity such as faulting. All five processes have been active in the project area during the Quaternary period (Pleistocene and Holocene epochs).

Until the early 1960s, most Gulf Coast geologists believed that the rapid rate of post-glacial sea level rise (the Holocene transgression) slowed abruptly about 5,000 yrs ago when sea level had attained essentially its present level. Since that time, the rate of rise has been relatively slow and not a major component of subsidence. Calculations of subsidence rates have been made in several portions of the deltaic plain using radiocarbon dates and observations of structures (Kolb and VanLopik 1958). These illustrate that primarily because of consolidation within the Gulfward-thickening prism of Holocene deltaic deposits, rates increase sharply from north to south and reach their maximum in the modern delta. Extrapolating and interpreting from the calculations, it is suggested that the subsidence rate in the project area for at least the last few centuries averages more than 2.5 mm/yr. Within the last several decades, most geologists have come to realize that sea level did not attain its essentially present level (±1 m) until about 3,500 yrs ago, and that about 5,000 yrs ago, the level was perhaps several meters lower than at present. Consequently, the subsidence rate mentioned above is valid for no more than the last 3,500 yrs--prior to that time, a higher rate of the sea level rise component of subsidence would have made the total subsidence rate much higher. The progression of geologic knowledge and concepts has also led to the now-widely-accepted hypothesis that the rate of sea level rise during the Holocene has been episodic rather than steady, producing a step shape to a sea level rise curve (Penland, Suter and McBride 1987). For example, it has been postulated by the above authors that between 3,000 and 4,000 yrs ago, the rate of sea level rise was about 6.0 mm/yr. During that period, this amount would have to be added to that contributed by the other components of subsidence. However, for about 2,000 yrs prior to that period, the authors feel that sea level had been relatively stationary.

Geomorphic Processes

The prism of Holocene deltaic deposits represents a series of distinctive onlapping sedimentary cycles initiated by upstream diversions of river flow, each cycle being the correlative of a discrete delta complex. Each cycle involves sediments laid down in multiple environments ranging from freshwater to saline in the dynamic zone of interaction where the river emptied into the Gulf. The cumulative result of multiple cycles has been the net buildup and seaward buildout of the deltaic plain. In a fairly recent and widely accepted model of deltaic plain formation, Frazier (1967) recognized five major delta complexes (also called subdeltas) that have formed in the last 7,300 yrs (Figure 5). The St. Bernard and Lafourche complexes are the only ones of the five that have directly

affected the project area, with the latter being by far the more important.

Each delta complex in turn involves a series of delta lobes, a lobe being defined as that portion of a complex that formed during a relatively short period of time (decades to centuries), and that can be attributed to a single or discrete set of deltaic distributaries. Each lobe involves a characteristic pattern of sedimentary facies representing discrete environments of deposition such as natural levee, intratidal wetland, and bay-sound. According to Frazier's model, and referring to Figure 3, the Bayou des Familles (No. 7) lobe of the St. Bernard complex and the Bayou Blue (No. 10), Bayou Black (No. 12), Bayous Lafourche and Terrebonne (No. 14), and Bayou Lafourche (No. 15) lobes of the Lafourche complex have affected the project area to some extent. These are discussed more fully later in this report.

Because of the prevailing influence of subsidence and sea level rise during the Holocene, each delta lobe has experienced a constructional or progradational phase in which fluvial processes dominate, and a subsequent destructional or transgressive phase in which marine processes become progressively more dominant. Frazier (1967) developed a model of a typical delta cycle and used a series of block diagrams to illustrate the landforms, depositional environments, and subsurface sedimentary facies associated with four phases (Figure 6).

A cycle begins with an upstream avulsion, possibly initially as a major crevasse, in which river flow and fluvial sediment is introduced into a shallow basin between older lobes or complexes (Figure 6). Initial sedimentation consists of prodelta silty clays that are deposited basinwide from materials carried in suspension during major floods. Off the mouth of a newly formed channel, delta-front silty sands and silty clays accumulate rapidly, and the water shoals. As the channel reaches a given point, distributary mouth bars accumulate rapidly, and deltaic sediments become emergent in the form of mudflats and bars. These are rapidly vegetated with freshwater marsh. During the following years and decades, the marsh is periodically inundated during floods and the suspended sediment, mostly silts and clays, accumulates along the sides of the active distributary channel, beginning the process of natural levee growth. The mouth of the distributary advances seaward mostly during major floods when rates of progradation may be on the order of several hundred meters.

During the next stage in the cycle (Figure 6), as the distributary mouth advances past the given point, the distributary channel grows wider and deeper to accommodate increased discharge. Concurrently, the natural levees subside into the softer underlying deposits but achieve net growth (increased height and width) through the addition of new sediments. The natural levees soon acquire their typical prism or wedge cross-sectional shape. It is during this stage that extensive freshwater marshes essentially replace shallow brackish water in the interdistributary basins, and peat and highly organic clays begin to accumulate under the influence of progressive subsidence.

While the deltaic lobe is still enlarging, natural levee growth is by way of sheet flooding during high water stages and the occasional concentration of flow in small crevasses. As the delta lobe nears maximum enlargement (latter part of stage B, Figure 6), and natural levees approach maximum height, crevasses become much less numerous but those that form are larger and more persistent. They occur along distributaries in a lobe, but they may also occur upstream along the trunk channel.

Throughout the stage of lobe enlargement, natural levee ridges are large enough to support deciduous hardwood forests in all but the most Gulfward or distal ends of the distributaries where occasional inundation by brackish water allows only salt-tolerant shrub growth. The end of the stage of lobe enlargement marks the maximum extent of freshwater conditions in the interdistributary wetlands. Additionally, because river discharge through the lobe is nearing its maximum, there are appreciable amounts of turbid flood water reaching the

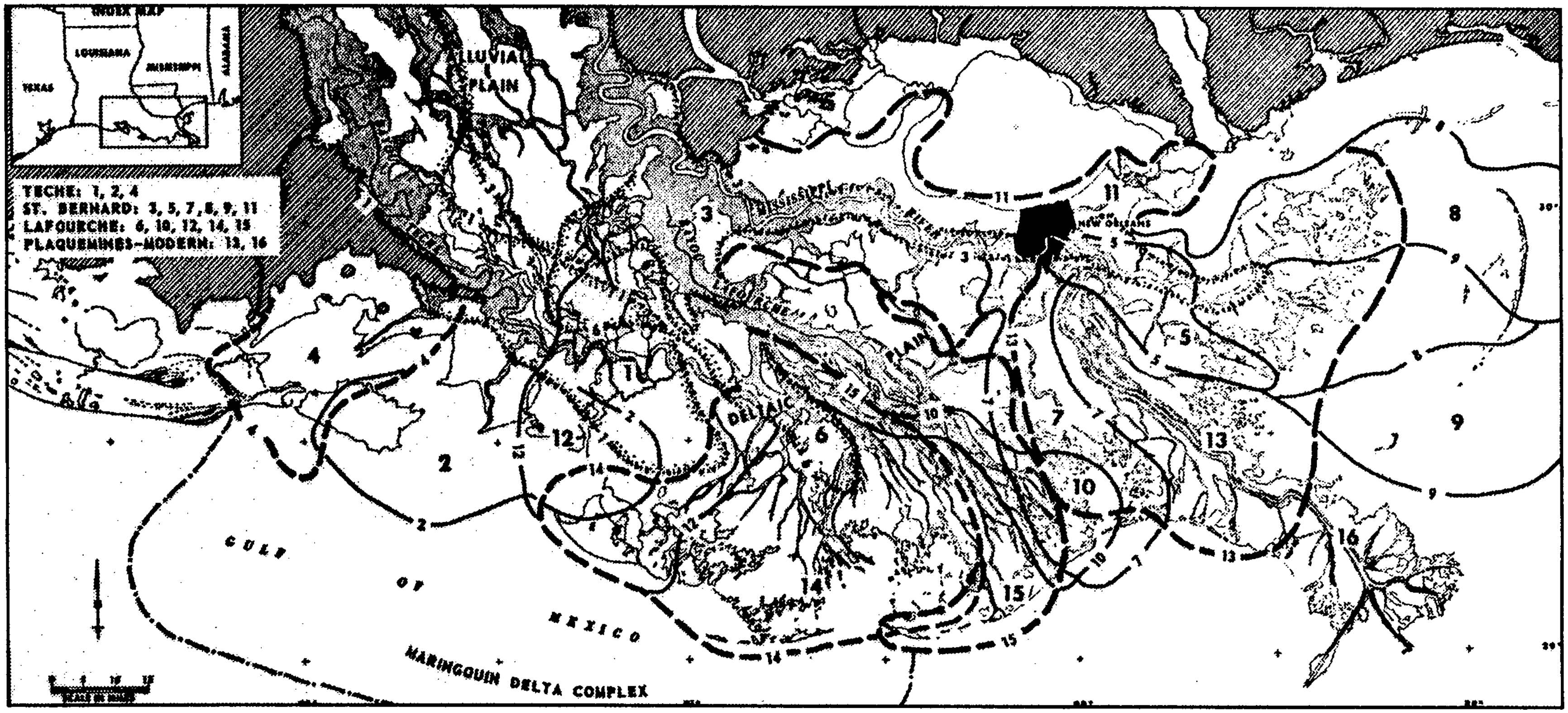


Figure 5. Delta complexes and lobes formed by the Mississippi River during the Holocene. From Frazier (1967)

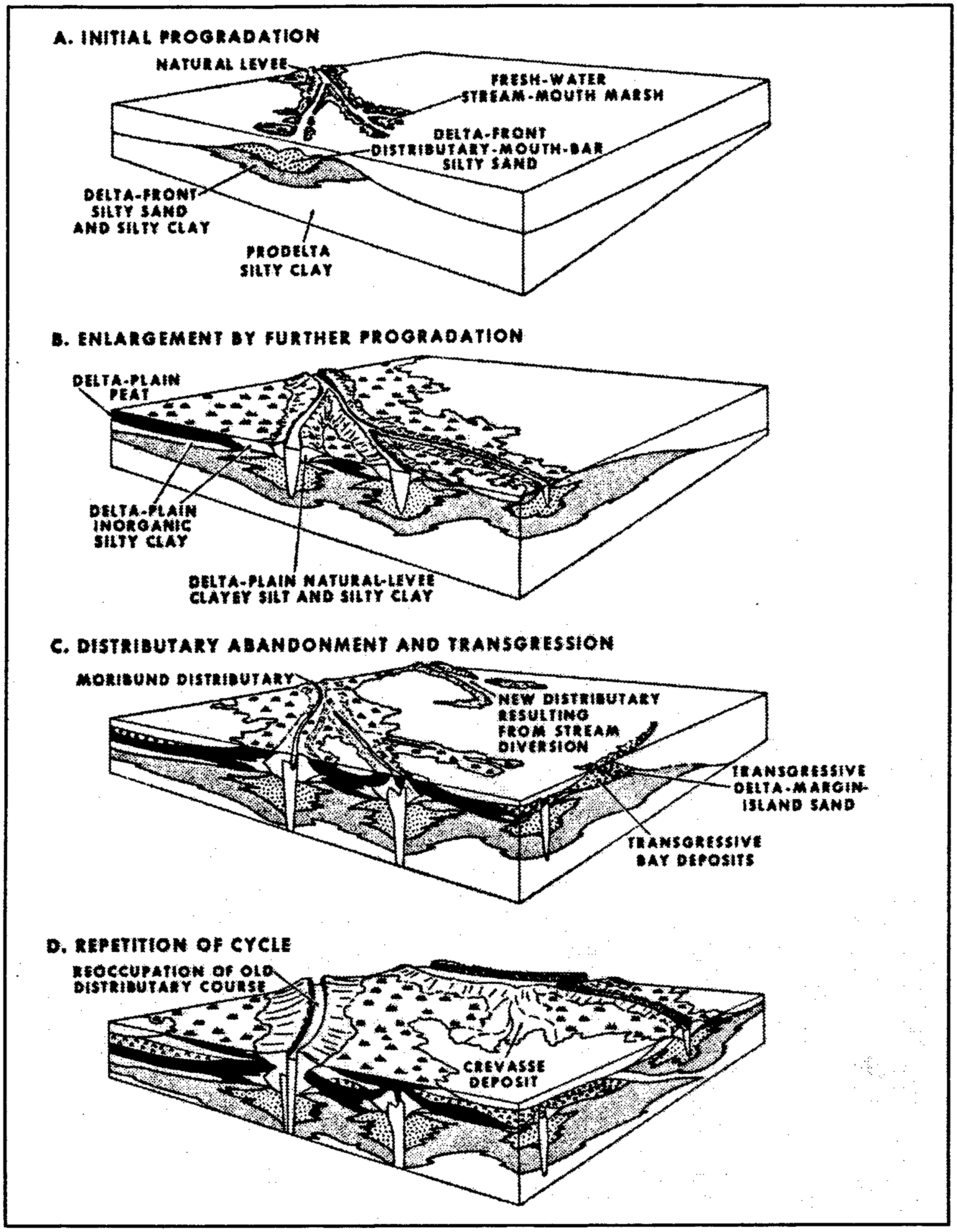


Figure 6. Depositional environments and sedimentary facies associated with the four typical phases of a delta lobe cycle. From Frazier (1967)

interdistributary basins through crevasses and the consequent deposition of appreciable amounts of clays. Because of these factors, the upper parts of the interdistributary basins are able to support cypress-tupelo swamps.

After a delta lobe builds seaward over a period of centuries and essentially fills an estuarine area, conditions of stream gradient, channel hydraulic efficiency, and other factors begin to favor an upstream diversion or avulsion. When this eventually takes place, the delta lobe enters a stage of abandonment and deterioration because with declining discharges, sedimentation rates (both organic and inorganic) are no longer able to exceed or even keep pace with subsidence rates. Several important changes in physiography, environments, and geomorphic processes begin to occur as shown in Figure 6.

At the proximal end of the lobe, the most noticeable change is the progressive downstream filling (shallowing and narrowing) of abandoned distributary channels. Over a time frame measured in decades to a few centuries, the channels in that area evolve into slackwater streams or in some cases swamp-filled depressions. At the distal end of the lobe, changes are much more dramatic and rapid. Nearshore processes of wave action and longshore currents in the Gulf begin to erode and rework distributary mouths, and the coarser sediments accumulate in beaches and spits that begin to migrate landward. Slightly farther inland, subsidence and salt-water intrusion begin to take their toll. Brackish marsh evolves into saline marsh in interdistributary basins and begins to break up as tidal channels, lakes, and bays enlarge and become more numerous. Along the distributaries, natural levees subside progressively more from south to north and are encroached upon laterally by the adjacent wetlands.

Reconstruction of the history of the deltaic plain indicates that delta lobe deterioration can proceed to widely varying degrees before a new cycle is initiated by an upstream river avulsion (Figure 6). Moreover, the next cycle may affect an area adjacent to the old one or an entirely different part of the deltaic plain. Since subsidence is ubiquitous, eventually the decaying lobe, or the area that it occupied, will be overlapped by a new one.

Focusing on the erosional phase of an abandoned delta lobe (Figure 6), Penland and Boyd (1985) have developed a three-stage evolutionary model (Figure 7). A lobe (or complex) is successively transformed from an erosional headland with flanking barriers (Stage 1) to a transgressive barrier island arc (Stage 2), and finally into a subaqueous inner-shelf shoal (Stage 3). Subsidence of the abandoned delta plain and marine reworking are the key elements in driving the evolution of each barrier shoreline in Louisiana. Subsidence causes changes in sediment supply and in the physical process environment which, in turn, induce the sequential stages observed during the evolution of deltaic barrier shorelines. An erosional deltaic headland sediment source is the key factor in the interpretation of barrier shoreline genesis.

The Bayou Lafourche coastal barrier system represents the largest example of an erosional headland with flanking barriers (Stage 1) on the Louisiana coast. The barrier system consists of the Bayou Lafourche erosional headland, the Caminada-Moreau coast, and two nearly symmetrical sets of flanking barriers, i.e., the Caminada Pass spit and Grand Isle to the east, and the Timbalier Islands to the west (Figure 3). These barriers have developed since the abandonment of the Bayou Lafourche distributary. The shoreface has retreated, actively reworking the distributary sand bodies and the beach ridges of Cheniere Caminada. The sediment dispersal pattern consists of longshore sediment transport divergence from the central erosional headland, and sediment accumulation downdrift in marginal spits, flanking barrier islands, and tidal inlets both east and west of the erosional headland. Grand Terre is a transitional feature that has been affected by longshore sediment transport from the headland, but probably also includes remnants of the interdistributary wetlands

associated with an earlier Lafourche complex lobe.

Depositional Environments

Largely as a result of the geologic study by Conatser (1969, 1971), considerable data are available on the six depositional environments of Grand Isle that can be extrapolated to similar ones on Grand Terre. However, since the project area actually lies offshore rather than on the islands, only brief descriptions of the environments are provided so the reader can envision the regional landscape.

The most conspicuous elements of the island are the active beaches. These are low, gently sloping features composed on fine sand with shells and shell fragments. The Grand Isle beach has been extensively enlarged by groins and artificial beach nourishment and now has a width of about 610 m (2,000 ft) at the northeast end of the island as compared with an early historic-period width of less than 100 m (328 ft). Behind the beach is a low dune ridge about 15 m (50 ft) wide and only about 1.8 to 2.1 m (6 to 7 ft) high. The dunes, consisting of fine to very fine sand, are sparsely vegetated with beach grasses and have suffered major damage as a result of hurricane storm waves. Submarine bars (sometimes called offshore bars) are present offshore from the beach and extend seaward for as much as 3,000 m (9,840 ft) off the eastern end of the island (Figure 4). The bars are generally submerged but may become emergent at very low tide.

Behind (inland from) the dune ridge, the island landscape consists of tracts of narrow, linear accretion ridges separated by narrow swales. The ridges are up to about 1.2 m (4 ft) high, and as many as 35 ridge units are present. Each ridge represents a shoreline position of a beach and dune ridge that was stable for a brief interval during an overall period of seaward buildout. The pattern of ridges and swales (Figure 4) indicates the direction of net island growth which, in the case of Grand Isle, has been to the northeast. Especially on the southwestern half of the island, the accretion topography is veneered with washover-fan deposits. These are sheet-like sand deposits created when storm surges broke through the dune ridge and flowed across the island into the adjacent bay waters.

Marsh deposits on the bay sides of the islands probably are underlain by washover deposits laid down in shallow water and colonized by brackish-water vegetation during tidal cycles. However, it cannot be dismissed that some may be remnants of interdistributary deposits of the distal end of a Lafourche complex delta lobe against which barrier island accretion has taken place. It definitely appears that the intratidal wetlands of Fifi's Island (Figure 7), which is separated from the northeastern part of Grand Isle by the narrow Bayou Rigaud, falls into the interdistributary marsh category.

Turning attention to marine environments, Barataria Pass *per se* is an erosional tidal channel that has scoured deeply into Holocene deltaic deposits. Due primarily to the difficult-to-erode nature of the clayey deposits, it has been basically stable in location at least during the latter part of the historic period with perhaps some limited about of migration to the northeast. While stable in location, no doubt the pass experiences scour and fill during episodes ranging from daily tidal cycles to occasional hurricanes and tropical storms. During tropical storms, water that may build up in Barataria Bay during several days of southerly winds may be "released" quickly during sudden shifts in wind direction. During such times, tidal currents are very strong and severe scour takes place.

Over longer periods of time such as decades, sand is fed into the pass system by littoral drift. That material not incorporated into the beach or dunes may become temporarily trapped in submarine bars but eventually will feed into the pass system. Therein, it is swept back and forth and may become a part of the submarine ebb or flood deltas at the ends of the pass. A relatively small amount of it may bypass the pass system and become incorporated into the Grand Terre beach or beyond. Also, during severe storms, beach scour due to wave attack

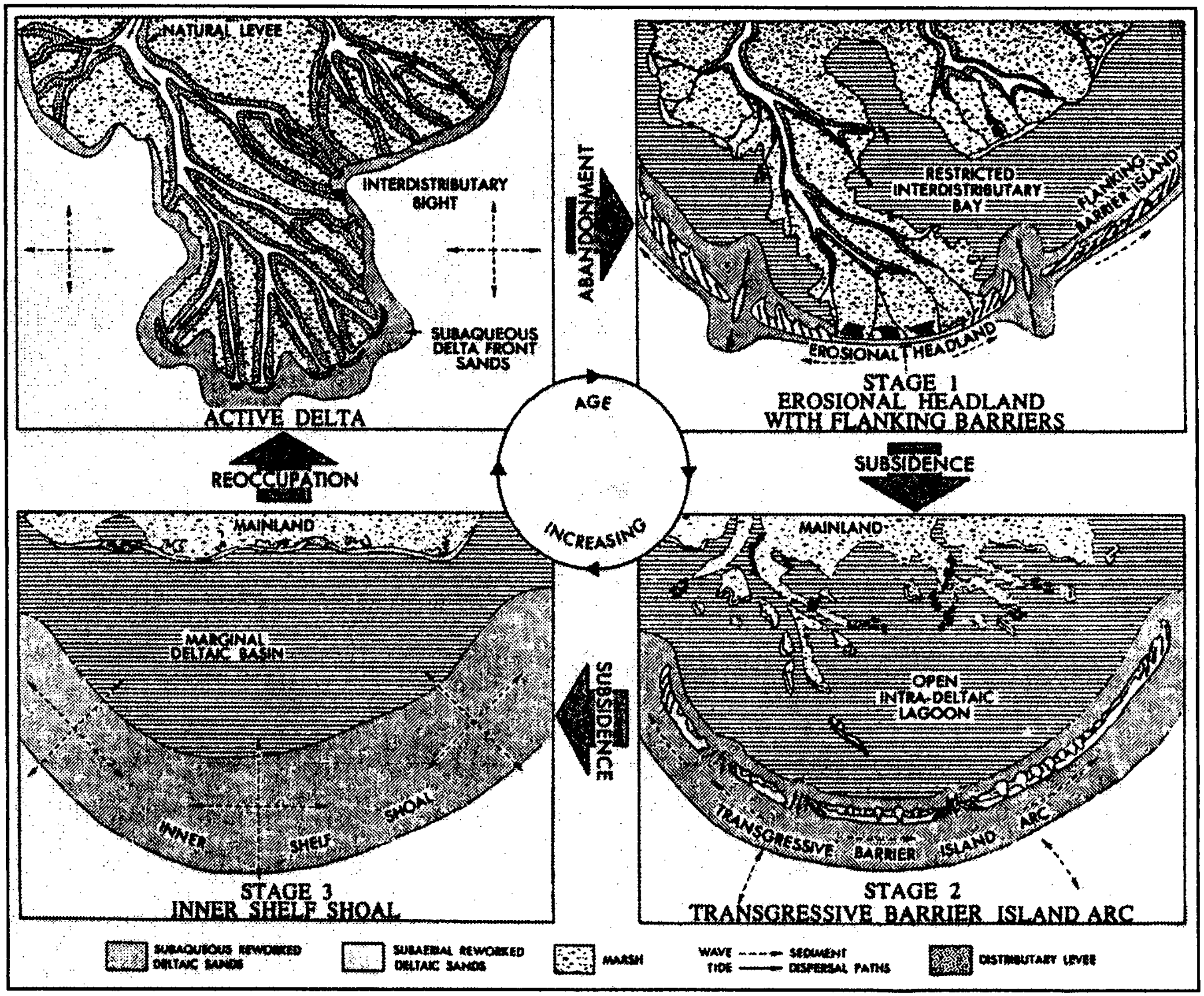


Figure 7. Three typical stages in the transgressive depositional history of an abandoned Mississippi River delta complex. From Penland and Boyd (1985)

will displace much sand and steepen the offshore profile (Penland and Boyd 1985). Following storms, the offshore profile will build back, but usually will not quite attain pre-storm conditions. The material that does not build back enters the littoral drift system.

Coastal Changes

Figure 8 shows the extent of land loss and gain in the Grand Isle-Grand Terre area during the period from 1887 to 1988. At least during the historic period, and since abandonment of the Bayou Lafourche distributary, erosion of the Lafourche headland has been a dominant process. As much as a kilometer (0.62 mi) of land has been lost along and west of Caminada spit. This loss extends eastward and includes much of the western half of Grand Isle. Land loss also has affected the bay shorelines of both Grand Isle and Grand Terre and is attributable to wave erosion acting under the prevailing influence of subsidence. There is insufficient suspended sediment in Barataria Bay getting into the marsh to counteract the effects of these processes.

During the same interval, the Gulf shoreline of the eastern half of Grand Isle has experienced considerable accretion. A careful look at surveys of various dates reveals that prior to 1956, there was very little erosion on the western half of the island and very little accretion on the eastern half (Williams, Penland and Sallenger, Jr. 1992). The reason for the rapid acceleration in the erosion rate since 1956 is not known, but it is clear that the accretion on the eastern half of the island is due in major part to jetty and groin construction and/or artificial beach filling. The jetty at the eastern end of Grand Isle may also be interrupting the supply of littoral drift sand to Grand Terre and may be the cause for accelerated erosion on that island.

It should be noted that despite the appreciable Gulf shoreline changes, there has been essentially no change in the location of Barataria Pass and perhaps only a slight widening. This is interpreted as evidence of the effective tidal flushing action and probably the growth of the ebb tidal delta and submarine-bar zone. Both of these are dynamic environments with nearly constant change taking place.

Subsurface Stratigraphy

Conatser (1969, 1971) has investigated the stratigraphy of the upper 97 m (320 ft) of the subsurface of Grand Isle using the logs of more than 100 borings. The sedimentary sequence consists dominantly of prodelta clays but these deposits are interrupted by four sand units that have both local and regional significance. The units are discussed below, from deepest and oldest to shallowest and youngest.

The deepest, or "D" sand, is regionally extensive and occurs at a depth of 62 to 75 m (204 to 245 ft). It is composed of fine to medium sands with both silt and gravel lenses. The thickness of the unit was not determined, but regional correlations suggest that it may be about 36 m (120 ft) thick where it occurs to the east of the east end of Grand Terre. This sand is interpreted as being late Pleistocene to early Holocene strand plain deposits that were laid down by transgressing seas as sea level rose at the end of the last glacial stage.

The "C" sand has a maximum thickness of 3.4 m (11 ft) and it occurs at a depth of 28 to 29 m (93 to 95 ft). It is a very silty fine sand and has been interpreted as being nearshore sediments deposited offshore from an early (Bayou Blue?) lobe (Figure 3, No. 10) of the Lafourche delta complex.

"B" sand deposits occur at a depth of 6.7 to 11.3 m (22 to 37 ft). They occur only beneath Grand Isle, rather than being regionally widespread. The morphology and sedimentary characteristics of the unit indicate that it is an older barrier island deposit due to the erosion of an earlier Lafourche delta lobe. As discussed in the next section, the age and origin of these barrier island sands are important since Barataria Pass dates *at least* to the date of the sands.

The "A" sand is the youngest and shallowest unit, ranging in thickness from 4.6 to 9.7 m (15 to 32 ft) thick. The relatively thicker portions of this barrier island unit are

near Barataria Pass, probably indicating a slight migration of the pass to the northeast. The deposits are dominantly fine sands deposited in beach and nearshore marine environments. Offshore, the deposits thin progressively and are not present beyond the 20 ft (6.1 m) bathymetric contour.

History and Chronology

Despite the presence of thousands of borings and dozens of radiocarbon dates, there is considerable disagreement among geologists over the correlation of particular deposits and landforms with particular Lafourche complex delta lobes, and with the ages of the lobes themselves. Detailed subsurface correlations have been lacking, and the stratigraphic contexts of many of the dates are indefinite and/or argumentative. Rather than presenting a long and tedious discussion of the alternative hypotheses, the scenario presented below has been taken primarily from the work of Frazier (1967), and it is accepted herein as the most holistic chronological model currently available and widely known but with the caveat that aspects of the model are weak and have been challenged.

The period from about 18,000 to 11,000 yrs ago marked the waning of the Late Wisconsin glaciation, wasting of the Laurentide ice sheet over North America, and the rapid and major rise in sea level known as the Holocene transgression. As the Mississippi River continued to transport huge volumes of meltwater and outwash to the Gulf, away from the Mississippi entrenchment and those of smaller streams, the coastline once again retreated rapidly inland. This marked deposition of the shallow-water, marine, strand plain deposits underlie Grand Isle ("D" sands). West of the project area, the Mississippi River ceased carrying glacial outwash to the Gulf and changed from a braided to a meandering regime. The dominant sediment load of the river changed from sands and gravels to mostly clays, silts, and fine sands.

By about 9,000 yrs ago, the first Mississippi River delta complex—the Outer Shoal complex—formed well offshore from central coastal Louisiana when sea level was perhaps about 5 m (49 ft) lower than at present (Penland *et al* 1988). Apparently, this complex was inundated and largely destroyed within 1,000 yrs by rising sea level but was followed by a second one—the Maringouin complex—that formed about 7,000 yrs ago, slightly farther inland and at a higher elevation. Geological studies indicate that the trunk course of the Mississippi River that was associated with both delta complexes was located along the western side of the alluvial valley along the route of the later Teche meander belt (Figure 3) (Saucier 1994).

With sea level only slightly lower than at present, the Mississippi River began constructing the Teche meander belt and Teche delta complex about 6,000 yrs ago (Saucier 1994). Although this complex did not develop a lobe as far southeast as the Barataria Bay/Grand Isle area, nevertheless, it introduced fine-grained prodelta deposits into the area and began to shallow the Gulf waters. Following an upstream diversion about 4,800 yrs ago wherein the Mississippi River shifted to a meander belt along the eastern side of its valley (Figure 5), the Teche delta was abandoned and began to deteriorate under the influence of subsidence and marine erosion. Subsequent deltaic growth took place in the St. Bernard complex (Figure 5) to the east, and this continued the introduction of prodelta sediments into the Grand Isle area. By about 3,400 yrs ago, the Grand Isle area may have experienced some distributary and intratidal wetland development during the Bayou des Familles lobe (Figure 5, No. 7), but this has not been established by definitive local studies. The area may have remained a shallow, turbid offshore Gulf environment.

Although Törnqvist *et al* (1996) have presented evidence to the contrary, most workers believe the first distributaries and vegetated wetlands to develop in the general area were associated with an early phase of the Lafourche complex, dating about 3,500 yrs ago (Frazier 1967). Nevertheless, the first subaerial deltaic deposits in the immediate Grand Isle/lower Barataria Bay area are not

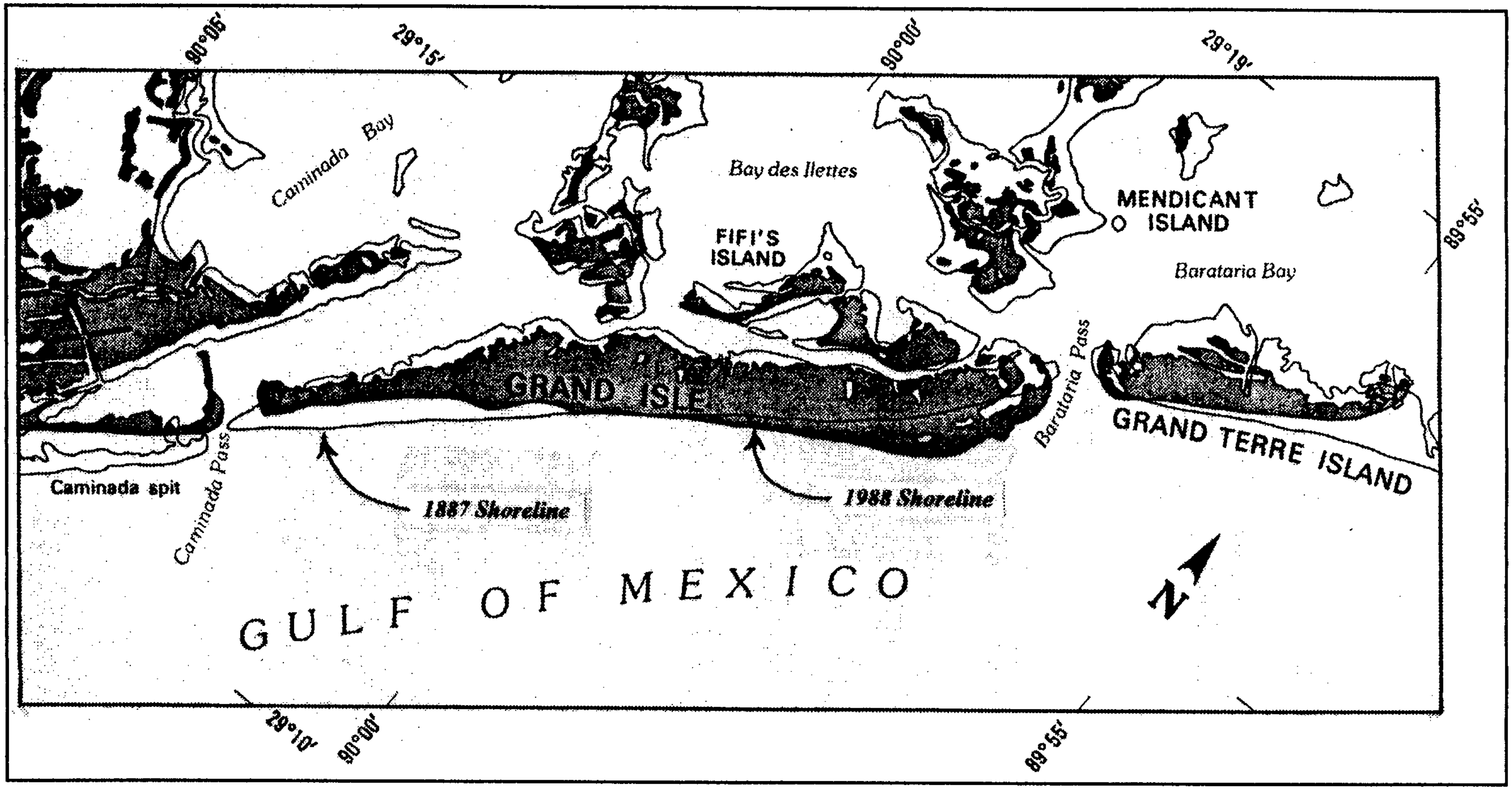


Figure 8. Coastal changes in the Grand Isle-Grand Terre area between 1887 and 1987 caused by a combination of headland erosion, subsidence, and littoral drift. Modified from Williams, Penland, and Sallenger, Jr. (1992)

believed to have formed until about 2,000 yrs ago, when the Bayou Blue lobe (Figure 5, No. 10) extended into the area. However, no direct evidence of these deposits has been discerned. Conatser (1971) has speculated that the "C" sand unit beneath Grand Isle may be related to an early phase of this lobe.

Still more prodelta sedimentation occurred in the area after the Bayou Blue lobe deteriorated. According to Frazier's model, the locus of active deltaic sedimentation was to the west in Terrebonne Parish (Figure 5, No. 14), where distributaries probably began forming about 1,200 yrs ago. Conatser believes that erosion of the distal end of one or more of the distributaries in that system began furnishing sands to the littoral current system which transported them northeastward, forming the barrier island now evidenced by the "B" sand unit. A single radiocarbon date places the age of the sand unit at about 920 yrs B.P. (Conatser 1971).

For a few hundred years following deposition of the "B" sand unit, prodeltaic sedimentation returned to the area for the fourth time. Soon the barrier island, cutoff from the littoral system, began to decay and eventually was submerged under the influence of subsidence. Prodeltaic sedimentation began to wane perhaps as early as 700 yrs ago when the Mississippi River began constructing the latest (Bayou Lafourche) lobe of that complex (Figure 5, No. 15). Buildout of the lobe continued for several hundred years, with sediments being eroded from the headland just west of the Barataria Bay area and carried northeastward to begin formation of Grand Isle. A single radiocarbon date indicates the age of the "A" sands to be less than 1,000 yrs old (Brannon 1957), and most workers believe that virtually all are less than 700 years old (Conatser 1971). The oldest sands obviously are toward the western end of the island, and progressively younger ones are toward the eastern end.

Geoarcheological Considerations

The probability that prehistoric cultural remains might be encountered in the dredged material disposal area south of Grand Terre is considered essentially nil. There is no definitive evidence that any land existed in the general area until about 900 yrs ago when a barrier island apparently formed beneath Grand Isle. Further, there are no data available to suggest an age for the vegetated wetlands that exist along the north sides of Grand Isle and Grand Terre, and to the north in Barataria Bay. They probably formed as part of a late Lafourche complex lobe; regardless of their age, they would not have been areas suitable for permanent habitation. Prehistoric sites could only be present at or near the surface on the older part of Grand Isle and possibly on deposits of similar age on Grand Terre, if they exist at all. Thus, the disposal area *per se* has been a subaqueous environment throughout the 12,000 or more years of human occupation of the region.

Barataria Pass *per se* is navigable to large vessels; however, the tidal deltas at each end are marked by much shallower water that severely restricts navigation. Moreover, until just the last few decades when dredged channels were created, the waters of Barataria Bay were too shallow to allow most commercial navigation. Nevertheless, the pass has seen abundant water traffic of a variety of types during the historic period. Grand Terre was inhabited as early as the late 1700s, and no doubt shallow-draft vessels frequented both this island and Grand Isle where there were active sugar cane plantations (Williams, Penland and Sallenger 1992). During the nineteenth century, the islands were frequented by the privateer Jean Lafitte, steamer packets from New Orleans, and a variety of brigs and schooners. Also, the construction and occupation of Fort Livingston on Grand Terre island after 1841 must have been accompanied by considerable military and supply vessel traffic. During the twentieth century, recreational and commercial fishing have been active in the area, as has the petroleum industry.

Thus, for about 200 yrs, the dredged material disposal site just to the east of Barataria Pass and partly on the ebb tidal delta could have been the site of frequent shipwrecks. Many of these could have

occurred during hurricanes and tropical storms, when vessels were seeking haven in shallow bay waters or bayous behind the islands. However, even though sedimentation rates in the area are high and the sandy bottom materials are in transit in the littoral system, most wrecks probably would not be buried and preserved. Rather, they probably were broken up and scattered by the high wave energy that would be concentrated on the shoal area. It is presumed that much of the disposed dredged material has had the same fate. Undisturbed clayey deposits underlying the shallow submarine bars and tidal delta are believed to be too old to contain historic remains.

CHAPTER III

HISTORIC CONTEXT

Introduction

This chapter provides a framework for understanding the terrestrial and maritime histories of Jefferson Parish. A basic overview of Louisiana history is presented, but emphasis has been placed on the development of the area, which includes the Barataria Pass project area, that was to become Jefferson Parish. Particular attention has been given to the identification of economic, social, and demographic patterns of change, and to the maritime contexts and their implications for submerged cultural resources. The political history of Louisiana and of Jefferson Parish has been recounted only insofar as it reflects larger economic and demographic trends. For a more comprehensive review of Jefferson Parish history and archeology, the reader is referred to Goodwin & Yakubik (1985).

Barataria Bay is a shallow body of water in southeastern Louisiana a few miles west of the Mississippi River; it is about seven miles wide and about 11 miles long (Figure 9). It extends in a southerly direction from the junction of the Gulf Intercoastal Waterway and Bayou Barataria 37 miles to the east end of Grand Isle where it enters the Gulf of Mexico. It is connected with the Gulf of Mexico by Barataria Pass. Connecting waterways between the bay and New Orleans consist of canals, lakes, bays, and numerous bayous. All the bayous and bays comprising the waterway are tidal. Barataria Pass (once known as Grand Pass) is the entrance of this water route into the Gulf of Mexico between Grand Isle and Grand Terre Isle, about 39 miles west of Southwest Pass of the Mississippi River, and 107 miles east of the Atchafalaya Bay Channel (US Congress 1917:doc. no. 200; 1956:vol. 31).

Because of the interconnecting waterways, the watershed of Barataria Bay is estimated at about 1,100 square miles. During normal conditions, there is not much current in the water system from Harvey to Grand Isle. Water levels vary from 0 to 1 foot. Winds may decrease that level by 1 to 2 feet, whereas rain may increase it by about 2 feet (US Congress 1917:doc. no. 200; 1956:vol. 31).

As noted above, the population of the tributary area of the Bay is relatively sparse, with the largest concentration of inhabitants in the southern reaches on Grand Isle. The upper reaches of the Barataria waterway are developed for residential and commercial purposes, while the marshes to the south are used by trappers and the bays and bayous contribute to the local seafood industry. Petroleum is an important and developed industry in the region, with drilling operations taking place in the Grand Isle leasing area in the Gulf of Mexico. Sulfur also is mined in substantial quantities near Barataria Bay. Traffic on the Barataria Bay Waterway has increased dramatically. For example, in 1944, 127,000 tons were transported; by 1954 tonnage had risen to 695,000 tons, with the principal item of maritime commerce being crude oil.

Rene Robert Cavelier, Sieur de La Salle, led an expedition down the Mississippi to its mouth, claiming the land for King Louis XIV of France on April 9, 1682. His ambition was to settle the area at the river's mouth and to establish posts throughout the Mississippi River Valley, thereby restricting British

colonization to the eastern seaboard of North America. On his second voyage to the area, La Salle and his colonists met with failure, and La Salle was murdered by his own men. A second attempt at colonization did not occur until 1698, when an expedition left France under the command of Pierre le Moyne, Sieur d' Iberville. A base was established on Ship Island, and Iberville and his younger brother, Jean Baptiste, Sieur de Bienville, led a party up the Mississippi River. When they returned, they established Fort Maurepas on the east side of Biloxi Bay. For the next several years, survival was the primary concern of the colonists. By 1711, Fort Maurepas was abandoned for a new post at the present site of Mobile. The following year, the colony was turned over to the proprietorship of Antoine Crozat, Marquis de Chatel. Crozat was no more successful at managing the colony that the French crown had been. Crozat petitioned to be released from his proprietorship in 1717, after losing an enormous amount of money. The proprietorship was assumed by John Law and the Company of the West (later the Company of the Indies). Their most important accomplishment was the establishment of New Orleans under the direction of Bienville in 1718. By 1721, almost 400 colonists lived in the settlement.

The financial difficulties that beset the colony in its first years would be chronic throughout the colonial period. The Company of the Indies, in financial ruin, returned control of Louisiana to the crown in 1731. By the end of the French colonial period, the colony still was not self-sufficient, much less profitable. France ceded Louisiana to Spain in 1762; Spain did not take formal possession of the territory until 1769. During the Spanish period, the population increased tremendously, primarily through the immigration of such groups as Canary Islanders, Americans, and African slaves. The economy prospered relative to the French colonial period. The Spanish imposed strict trade regulations, but smuggling flourished. Most significantly, a shift to sugar cane and cotton agriculture occurred during the 1790s. These would become Louisiana's two major money crops during the early nineteenth century. However, the colony remained a financial liability to Spain, and in 1800 they ceded the colony back to France. France took possession of Louisiana once again in 1803, shortly before the installation of an American administration.

The Louisiana Purchase in 1803 insured the rise of New Orleans as the major port of the Mississippi Valley. The ante bellum period saw continued population and economic growth, and New Orleans became the greatest port and city of the South during these years. Anglo-Americans entered Louisiana, drawn by the opportunities presented by cane cultivation. Trade and transportation improved with the introduction of steamboats and railroads. The merchant/planter class came to dominate the state socially, economically, and politically. Louisiana is a major factor leading to secession from the Union in January, 1861.

The Civil War had a devastating affect on Louisiana; New Orleans fell to Union troops early in 1862, and it remained occupied by Federal forces throughout the War. The loss of slaves created labor shortages for the planter class, and a lack of capital prevented the rebuilding of plantations. The net effect was a restructuring of the system for sugar production throughout southeastern Louisiana; by the end of the century, corporate ownership of plantations and consolidation of sugar processing was evident. Sugar became less important to Louisiana's economy in the twentieth century, and the area around New Orleans became increasingly industrialized. This period saw a boom in the state's lumber industry; later, oil and gas exploration and production witnessed similar growth.

Throughout its history, Jefferson Parish benefited from its proximity to New Orleans. Concessions in this area, granted shortly after the founding of the city, were successful as a result of the fertility of the land and the industry of the settlers. The Barataria region offered natural resources for extraction and routes for illegal trade, both of which

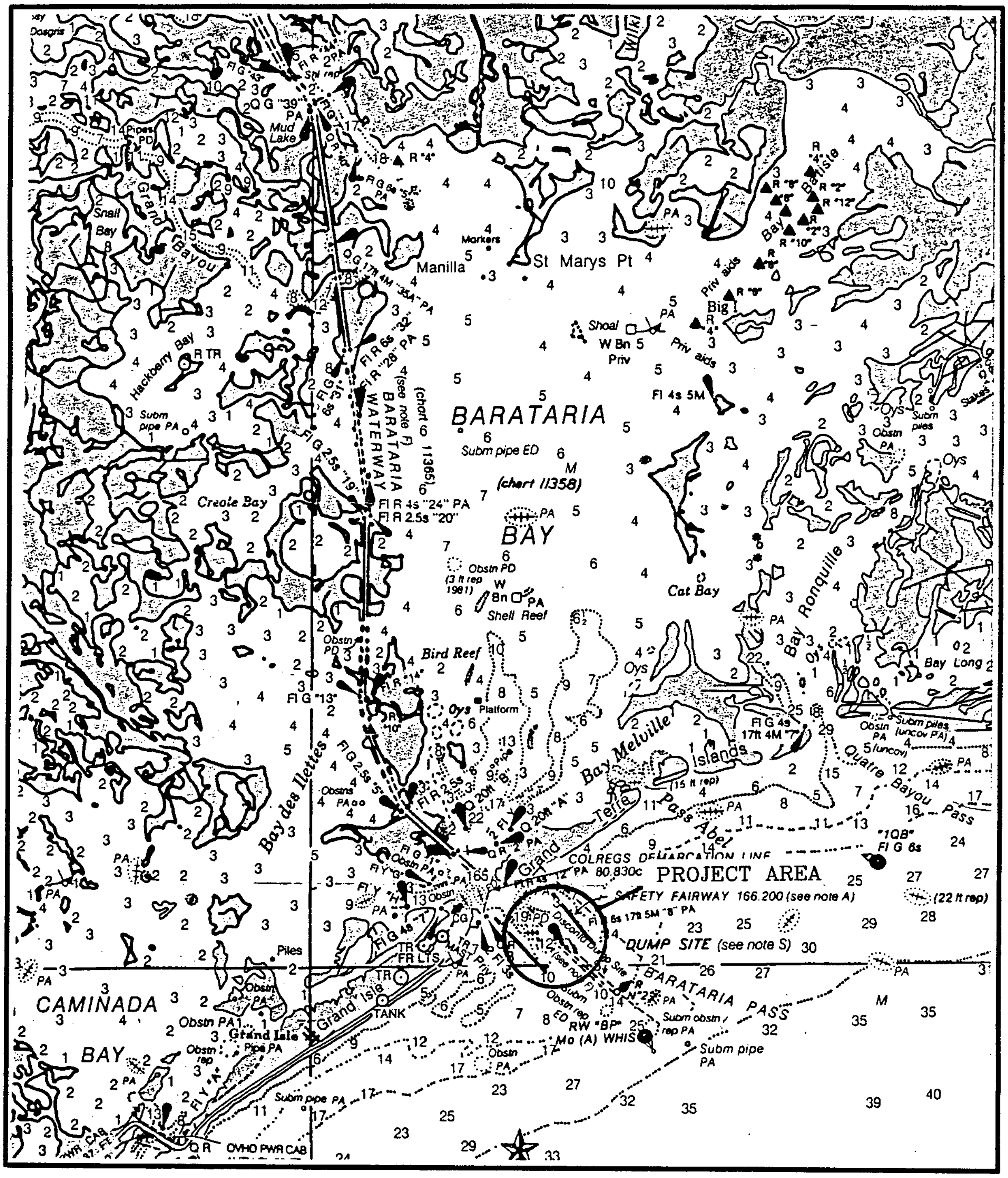


Figure 9. Excerpt from NOAA 1995 *Intercoastal Waterway, New Orleans to Calcasieu River, East Section* nautical chart (no. 11352), showing the environs of Barataria Bay

contributed to the local economy. During the nineteenth century, the development of transportation systems through the parish contributed to its growth, as did the urban development radiating out from New Orleans. Although the parish remained largely agricultural until the twentieth century, industrialization became increasingly evident by the end of the nineteenth century along the riverfront areas of Jefferson Parish. Since the end of World War II, the parish has developed both as a suburban residential area for the city and as a major center of industry and trade.

The French Colonial Period, 1683 to 1769

By 1682, La Salle had claimed the entire Mississippi River Valley for France. Initial French colonial efforts focused on the Illinois and the Gulf Coast regions. Early French attempts to settle and to develop colonial properties in the North American continent were undertaken in order to secure French territorial claims, although the accounts of the first French explorers noted that rich natural resources were present in America. France also sought to develop and to exploit the mercantile promise of its colonies. However, the goal of developing a prosperous American colony was not easily realized, and physical distance and governmental lethargy hindered the development of French territories. In 1712, Anthony Crozat's Company of the West contracted with the French crown to administer France's holdings in continental America. This enterprise was a rapid failure, and in 1714 the colony reverted to the crown.

Several years later, John Law acquired exclusive trade rights in America, and his Company of the Indies was contracted to administer the colony to France's political and economic advantage. Under an agreement with the Duc d'Orleans, Regent for Louis XV, Law's Company of the Indies was empowered to grant land; to transport and to settle 3,000 whites and 6,000 blacks in Louisiana; to promote agriculture; and, to serve as the exclusive trade agent within the colony.

The Mississippi River's natural levee was the earliest and most extensive area of French colonization in what was to become Jefferson Parish. These relatively high, fertile ridges, extending back from the river approximately one mile, were particularly suitable for settlement because of the relative scarcity of high land throughout south Louisiana. The soil's fertility and ready access to the river facilitated the development of cash crop agriculture and the shipment of people and goods.

As stipulated by Law's contract with the Duc d'Orleans, agriculture was emphasized and encouraged early in the colony's history. The Company of the Indies promoted agriculture by making large concessions of lands available to some of the most wealthy and powerful individuals and families in France, who were to serve as primary investors in agriculture in the new colony. The Company of the Indies also granted property to less notable petitioners who argued successfully their intentions to settle in the colony and to help it grow (Gayarre 1903: 240-241).

Plantation colonies were cleared and cultivated by laborers furnished by the Company of the Indies. John Law's colonial plans included the transportation of indentured servants, or *engagees*, to Louisiana. By 1721, the Company was involved in the impressment of destitute and criminal elements of Paris into involuntary service in the Louisiana colony. Penicaut noted the arrival of a Company slave ship from Senegal in 1721 (McWilliams 1953:251). Africans were thought to be particularly well-suited for agricultural labor in Louisiana's sub-tropical climate, and the Company provided slaves both for the residents of New Orleans and for plantation concessionaires. In 1724, the Code Noir, or Black Code, was enacted to provide the humane treatment of slaves, as well as to curtail their rights and liberties. In addition, this statute declared Catholicism the official colonial religion, and it provided for the expulsion of Jews from Louisiana.

The central depot at New Orleans provided a market where concessionares could sell their produce and purchase

imported goods, and all of the early concessions in the Jefferson Parish area had shipping access to the city, either via the Mississippi River or via Bayou St. John. The fertile alluvial levee ridges along the Mississippi River were cleared and planted in a variety of crops. Cypress forests lay beyond the river's natural levees, and the settlers felled trees for structural lumber and for fuel.

Cannes Brulees was another area of Jefferson Parish settled early during the French colonial era. Located upriver from the Chapitoulas Coast in the area today known as Kenner, the Cannes Brulees area consisted of two pieces of land that ran from the Mississippi River to Lake Pontchartrain. Large Company of the Indies concessions were granted at the Chapitoulas Coast and at Cannes Brulees. The concessions of the Chauvin brothers, Dubreuil, Kolly, Le Blanc, d'Artagnon, Diron d'Artiguette, and St. Julien were the initial focal points of settlement.

An addendum to the 1721 census characterized the state of agriculture in the Chapitoulas and Cannes Brulees regions. At that time, "corn and every sort of vegetable likewise (was) grown abundantly" (Ditchy 1930:225). The census noted that Kolly's Sainte Reyne concession produced about 600 "quarts" of rice in that harvest year (Ditchy 1930:223). The plantations raised vegetable and grain crops for household subsistence and for trade. Plows were used on the Chapitoulas Coast by 1723 (McWilliams 1953). In 1724, Joseph de Lery's Chapitoulas plantation produced 500 to 600 measures of rice, 60 barrels of corn, and 500 barrels of potatoes. His brother, Nicolas Chauvin de Lafreniere, produced 600 to 700 barrels of rice, 1000 barrels of potatoes, and 50 barrels of beans (Bezou 1973). Both indigo and tocacco were prominent exports from the Chapitoulas and Cannes Brulees regions during the French Colonial period. Bezou (1973:23) noted that the Chauvins produced 1,100 pounds of indigo in 1724.

Indigo was a particularly labor efficient crop; one slave could plant and tend two acres of the plant and still have ample time to attend to his own provisions (Holmes 1967:340). Each plantation usually had its own indigo processing facility, since the manufacture of dye from indigo was relatively easy and required no expensive machinery. The cut plant was placed in a vat called a "steeper," and the indigo then was covered with water until fermentation occurred. The liquid by-product then was drawn off into another vat called a "beater," where it was agitated much like the churning of butter. A precipitate was formed in the solution by adding lime water. The water was drawn off, and the indigo solids were placed in cloth bags to dry (Holmes 1967:344).

In addition to vegetable crops and indigo, the plantations at Cannes Brulees and the Chapitoulas Coast began raising livestock during the first years of settlement. The 1724 census listed the cattle present on the Chapitoulas Coast; collectively, the Chauvin brothers owned eighty-eight cows; thirty-five bulls; forty-eight calves; and, twenty-eight draft oxen (Bezou 1973:23). The 1766 census reports showed that sheep also were a common domesticate; 1,253 sheep were listed in that year for the Chapitoulas region alone (Voorhies 1973:71). As a result of this animal husbandry, the local market was provided with milk, butter, cheese, beef, and mutton (Bezou 1973: 38).

The Barataria region was a distinct, although less prominent, activity area during the French colonial period. Although early maps do not indicate major settlement efforts in the lower half of the project area, several archival records document apparent activity. Claude Dubreuil's land holdings during this period included tracts in the Barataria region. By 1740, Dubreuil had completed a 25 foot wide canal that connected the Mississippi River to Bayou Barataria, and thus to the Gulf of Mexico. His memoirs noted the shipment of fish and game from Barataria to the New Orleans market; French maritime troops used the canal as a means of transport for ships and people (Swanson 1975:88).

The bayou terrain of the Barataria Basin also supported stands of cypress, white oak, live oak, and elm. Substantial timber reserves were located upon the riverine concessions, as

well. The first settlers began exploitation of these timbered areas, since the very act of clearing land for cultivation necessitated lumbering. This wood was used for fuel, for ship timbers, and for building lumber. An early legal document, dated July 29, 1726, reported that Nicolas Chauvin de Lafreniere delivered one hundred boards and two barrels of tar to Mr. de Pauger in New Orleans (N.A. 1920:411). Bezou (1973:30) noted that Chapitoulas lumber went into the construction of the first church building in New Orleans, circa 1727.

Furs and hides were extracted from the interior forests for export to France. Some concessionaires were involved in the Indian fur trade, as well. A contract partnership between the three Chauvin brothers was recorded with the Superior Council on February 19, 1736; this document noted their involvement in the "trade of pelts with savages" (N.A. 1925:282).

Other important resources were found and exploited throughout the area that is now Jefferson Parish. Dubreuil noted in a memoir dated June 28, 1740, that there were "about one hundred" shell mounds on his land in Barataria; his concession processed the shells into building lime for his construction enterprises (Swanson 1975:88). It is worth noting that Dubreuil's memoirs provide the earliest documentation of the destruction of prehistoric archeological sites in the parish, if not in the region. Clay deposits along the rivers and bayous also were mined; early brickyards produced structural brick, tile, and pottery.

Despite the apparent rich potential of the land that was to become Jefferson Parish, the colony as a whole operated at a deficit. By 1731, the Company of the Indies had exhausted its financial resources, and they surrendered their charter in 1732. The colony reverted to the crown, and Louis XV reappointed Bienville as colonial Governor. Upon his arrival in the capitol, Governor Bienville assembled a ruling body, the Superior Council, composed of the Governor of New France, the Mayor of New Orleans, six councilors, the Attorney-General, and a clerk. This body assumed responsibility for day-to-day leadership and for the colonial legal systems, serving as mediators, legal curator of records, policy maker, and, criminal prosecutor. Bienville remained Governor until his death in 1743. The Marquis de Vaudreuil was named Governor of New France in that year; when Vaudreuil was appointed Governor of Canada in 1755, Captain Louis de Kerlerec was made Governor of Louisiana. Kerlerec served as Governor until the beginning of the Spanish period.

In 1762, Louis XV ceded the Louisiana colony to Spain by the secret Treaty of Fontainebleau. The exchange was partially induced by diplomatic considerations, since the crown sought to limit the amount of colonial land surrendered to England with France's imminent defeat in the Seven Years War. In addition, the primary motivation for French colonialism was mercantilism, and, as noted earlier, the Louisiana colony was a financial liability to war torn France.

The cession of the Louisiana Territory was not made public until 1764. Because Spain did not take immediate possession of Louisiana, French colonists hoped to convince Louis XV not to abandon the colony. Nicholas Chauvin de Lafreniere the younger, son of the concessionaire, drafted a petition that was carried to France by Jean Milhet in 1765. The King, however, refused an audience to Milhet. The first Spanish governor, Don Antonio Ulloa, arrived in Louisiana in 1766, but delayed taking formal possession of the territory until additional Spanish troops arrived. Ulloa promptly ordered a census; he also restricted trade in favor of Spanish interests. A group of French patriots, led by Lafreniere, held secret meetings to discuss methods for maintaining French patrimony over Louisiana. One of the methods discussed apparently was the expulsion of the Spanish by force. In October, 1768, at a meeting of the Superior Council, Lafreniere presented a petition demanding that Ulloa either provide the Council with formal credentials or that he leave New Orleans. Because of popular

support for this action, Ulloa departed as asked.

In August, 1769, Don Alejandro O'Reilly arrived in New Orleans with a fleet of Spanish ships. Shortly thereafter, the revolutionary leaders of the area surrendered to the superior force of Spanish authority. Feigning mercy for the French patriots, O'Reilly, the new governor, invited them to a reception, at which Lafreniere and his compatriots were arrested. After a trial on October 24, 1769, Lafreniere, Jean-Baptiste Noyan (Lafreniere's son-in-law), Pierre Caresse, Pierre Marquis, and Joseph Milhet were condemned to death; five other conspirators were given prison sentences. The properties of all of the condemned men were ordered confiscated, and Lafreniere and his comrades were executed by firing squad on October 25, 1769, ending the French Colonial Period.

Maritime Context

The Spanish were the first Europeans to sail the Gulf: Sebastian de Ocampo in1508, and Alonzo Alvarez de Pineda in 1519 (Weddle 1987). The era they initialized for Spain lasted for three centuries, and saw Spain increase its exploitation of the entire Gulf region from Vera Cruz to Havana. Spain's hegemony of an unbroken and uncontested expanse of territory in the Gulf lasted until 1699 and French colonization of the Louisiana Territory (Hoffman 1980).

By 1521, Mexico had been conquered and the newly acquired territories in the Gulf of Mexico were renamed *Nueva España*. Trade centers for supplies to Europe were formed at the mouths of rivers and embayments, where ships had easy access to the goods produced in the interior. From the interior, caravans of Indians and mules were employed to take the spoils of the New World to ships waiting, for example, at Vera Cruz, for the trip back to Spain; Vera Cruz became the principal port for gold and silver extracted from the mines of central Mexico. Other Spanish trade centers around the Gulf were at the Mississippi River, Mobile Bay, Pensacola, Tampa, Biloxi, and Galveston. On the way back to Spain, Havana became the principal assembly point for the New Spain and Terra Firme fleets for the final leg of the journey home.

The course taken by the ships through the Gulf returning to Spain during this period was north-northeast or northeast, the trade centers laying along a natural maritime route determined by Summer southeasterly trade winds and the Loop Current. During the day, the ships sailed northward and needed to be in sight of land only occasionally to determine how far to be west of shore (Coastal Environments, Inc. 1977).

By the mid-16th century, merchant vessels began to sail in convoys protected by warships (Hamilton 1934). The new larger ships also abandoned the old routes and began to sail through the Straits of Florida on their way back home to Iberia. From 1519 to 1699, Spanish fleets increasingly crossed the central Gulf on their way to Havana and then to Spain (Weddle 1985; MacLeisch 1989). Eventually, the Gulf route became fixed because of favorable currents and winds, and because of need for protection from pirates. These routes remained in use until the French entered the Gulf in the late 1600s.

The vessels used during this period in the Gulf of Mexico were either built in Europe or of European design. Vessels from this era can be classified according to the hull form (for example, a clipper), rig or sail plan (for example, a sloop), and a combination of rig and sail (for example, a catboat) (Wilson 1983). Information on smaller vessel types does not appear until 1688 (Chappelle 1951).

According to Garrison et al. (1989), caravels, galleons, naos, sloops of war, corvettes, pinasses, and flutes sailed the Gulf's coasts during the Spanish Period. Beginning in the 1500s, the Spaniards arrived in caravels--the type used by Columbus to sail to America. Caravels were small and fast ships of between 35 to 100 tons. By the mid-1500s, Spain developed larger vessels (300 to 600 tons), three or four masted galleons and naos, to carry New World treasures back to Spain. Both the galleon and the nao were of similar design, with galleons heavily armed and designated military vessels, while the

naos had far fewer cannons and were used as merchant vessels. Although bulky and top heavy, with high front and rear sections, naos were used well into the 17th century. Subsequent design changes in the late 16th and 17th centuries by the Dutch reduced the high sterncastle, making them less top heavy; the French gave galleons broader and more stable hulls, reduced the number of cannon, and placed them higher to reduce the possibility of water entering from the side of the ship (Singer 1998:12-14).

In the 1600s, two-masted, square-rigged vessels known as the Sloop Of War, or the Corvette by the French, appeared in the Gulf. Although used as a war vessel, in the early 1700s the sloop most commonly functioned as a merchant ship in the West Indian and coastal trade. Also in the 17th century, the French used the pinnace in the Gulf. This cargo ship sported 10 to 12 cannon, and three masts with square sails (Singer 1998:14-15).

The French fort established in 1702 on the west bank of the Mobile River provided access to the northern coast of the Gulf of Mexico, and the French developed new routes to their trade ports at Biloxi, Pensacola, Mobile, and New Orleans from their harbor on Dauphin Island. Fulfilling LaSalle's dream of planting a French colony to exploit the strategic importance of the Mississippi River, the French shipped their goods to and from markets starting with their colonies on the Windward Islands, New France, then through the Gulf Coast and the continent (Weddle 1985, 1987; Surrey 1916).

Spanish Colonial Period, 1769-1803

The Spanish took formal possession of the Louisiana Territory in August, 1769, with the arrival and installation of Alejandro O'Reilly as Military Governor. As noted above, O'Reilly quickly established Spanish authority in the colony. Besides structural political changes, however, the Spanish had little lasting influence on the area. The culture remained predominantly French, and French culture endured throughout the Spanish regime. In general, the economic and demographic patterns initiated during the French colonial period continued to develop under Spanish rule. Residential and industrial settlement remained focused on the Mississippi River. Since the Spanish granted small tracts to military officers and to petty officials, a mix of small and large plantations developed on the river. The Spanish colonial government also encouraged settlement of the Barataria region. Large tracts of land were granted there, and on the barrier islands. Refugee groups were moved into Spanish supported settlements.

Both white and black populations increased during the Spanish Colonial period. Population gains were made in Barataria, after Canary Islanders settled at Bayou des Familles. Isolated groups of freed blacks settled on the east and west banks of the Mississippi River, as well. Catholicism remained the colony's official religion. Despite national and political differences, French and Spanish families became allied through social and cultural affiliations.

During Spanish rule, Louisiana's economy continued to focus on agriculture, on forest products, and on commerce. However, commodities and trade patterns changed. Monocrop agriculture was more prevalent during this period; sugar replaced indigo as the primary crop by the end of the eighteenth century. This shift was hastened by a decrease in the profitability of indigo; by rising demand for processed sugar; and, by the development of an economical process to produce sugar from immature cane. Sawmills provided structural lumber and boxes for the Cuban sugar trade. Trade became subject to Spanish duties and market restrictions. The volume of English and American trade through New Orleans also increased as a result of the accelerating establishment of settlements north of Louisiana. New Orleans thrived as the official port of deposit for goods shipped via the Mississippi River.

Despite his inability to take control of Louisiana, the first Spanish Governor, Antonio de Ulloa, had authored and issued orders that set the stage for the disruption of trade networks established by the French. Ulloa demanded that all ships harboring or

trading at New Orleans report their freight tonnage and cargo value; duties were to be charged accordingly. All Louisiana trade was to be shipped only on Spanish-built and Spanish-owned vessels; all imported or exported goods were to originate at Spanish controlled ports. In 1769, Governor Alehandro O'Reilly reaffirmed Ulloa's initial commercial legislation. In addition, O'Reilly forbade all trade with the British and with any ships anchored on the Mississippi River outside of the harbor of New Orleans. All Louisiana shipments, whether bound upriver or toward the Gulf, were commanded to anchor at New Orleans; to make accurate cargo reports; and, to pay appropriate duties on freight and wharfage. The region's inhabitants strongly opposed the economic restrictions imposed by the Spanish crown: selective trade with the French, British, and Spanish had improved the fortunes of many French settlers.

The anti-British trade prohibition reflected the long standing enmity between Spain and England. The restrictions on free trade also sought to capture revenue lost through French and British trade on the river. O'Reilly's prohibition against trade with ships outside of the harbor at New Orleans sought to curtail tax loss and to disrupt any French-British trade relations. Riverine trade revenue was substantial; the British (and later the Americans) were developing upper valley settlements and sending western produce to down river markets. English traders evaded commercial restrictions by anchoring their ships in the river above New Orleans. Planters were extended liberal credit; they also received imported goods in exchange for local produce and commodities. This tension between prominent French colonials and Spanish officials remained unabated until the end of Spanish domination.

Political alienation between the French and Spanish was exacerbated by economic issues. The Spanish command viewed Louisiana as a subservient mercantile colony; all returns from trade, agriculture, and colonial manufacture were to support Spain's commercial and military efforts throughout the world. Conversely, the lax French colonial administration had fostered self determination in economic and political matters among the settlers.

In keeping with their colonial policies, the Spanish claimed large tracts of Barataria forests to supply their European and New World navies. Thus, the Spanish were largely responsible for initial serious settlement in the Barataria region. Although the French had exploited the resources of the region, the Spanish government actively encouraged residential and industrial settlement along the bayous and barrier islands. The majority of French concessions had granted land fronting the Mississippi River. Spanish patents fronted the bayou watercourses in Barataria, as well. As an impetus to agricultural cultivation along the bayou, Governor Galvez settled a group of Canary Island refugees on Bayou des Familles in 1778. A house was built for each family, and a church was erected in the settlement. The refugees were given farming equipment, cattle, fowl, rations, and monetary assistance (Martin 1975:224). In addition, the Spanish government granted possession of Grande Terre to Joseph Andoeza by 1794; Grande Isle was entirely ceded to agriculturists by 1787.

The 1785 census of Spanish Louisiana documented 1,128 whites, 263 free persons of color, and 5,645 slaves on the "Costa de Chapitoulas" (Davis 1806:136; Martin 1975:230). Population at Barataria first was listed in the 1788 census. In that year, forty people were counted at bayou settlements, while the Chapitoulas Coast boasted a total population of 7,589. The census count tabulated just prior to the Louisiana Purchase showed a very slight decrease in the population of the Chapitoulas Coast; 101 persons resided in Barataria at that time (Martin 1975:300).

Numbers of slaves in the area rose as the result both of continued importation and of natural population increase. In the 1785 census, black slaves outnumbered white persons by 4,517(Davis 1806:136). Sterkx (1972:39) also noted increasing numbers of free blacks during the Spanish period; manumission accounted for the majority of

this growth. Citing the 1785 Spanish census, Sterkx (1972:85) noted that the greatest concentration of rural free blacks was found at the Chapitoulas Coast, where 203 were listed. This concentration seems reasonable, since Chapitoulas also had a large black population during the French period. The *American State Papers* document land claims made by freed blacks opposite of Twelve Mile Point (Lowrie and Franklin 1834). There, six black landowners claimed adjacent lots above present-day Waggaman; three others claimed parcels between Waggaman and the Labranche land. On the east bank of the parish, freed blacks claimed small contiguous lots below the Metairie Ridge. The claimed lots generally were narrow and shallow; many were adjacent to large established plantations. In addition, the St. Amant and Fazende families, free people of color, held land on the west bank at Nine Mile Point.

As noted previously, Spanish legislation attempted to crush established French commercial networks. Because the local inhabitants sought to develop methods to circumvent Spanish authority, an extensive trade network developed in the Barataria district during the Spanish period. Two artificial canals connected the Mississippi River above New Orleans to bayou waterways that flowed into the Gulf of Mexico. Goods and slaves shipped by this route bypassed both New Orleans and Spanish duties. Claude Joseph Villars Dubreuil's west bank canal had been constructed during the French period. A second canal cut through "Petit Desert," connecting the Mississippi to Bayou Segnette. This route to the Gulf of Mexico was in use at least as early as 1794. Thus, the Barataria region witnessed a rapid expansion of smuggling in circumvention of Spanish political and commercial legislation.

Governor O'Reilly's regulations for the colony also specified that individual landowners were held responsible for bridge and ditch construction on their land, and they were obliged to keep adjacent roads and levees in good repair. Failure to meet these conditions resulted in forfeiture of granted lands (Bezou 1973:51). The regulations called for appointed syndics to manage individual levee districts; they gave height specifications and construction methods for the river levees, and they forbade the grazing of "horses, mules, cows, oxen, and pigs" on levees. Plantation owners were bound, by threat of fines, to contribute slave labor to levee construction. If lack of funds and/or slaves prevented land owners from maintaining their property to the satisfaction of the Spanish authorities, the owners could be forced to sell their holdings. Additional Spanish ordinances levied taxes for civic improvements within the City of New Orleans (Bezou 1973:51).

During the Spanish period, agrarian activities in the region included subsistence and cash crop cultivation. The Spanish authorities and the area's inhabitants continued the profitable felling and processing of timber for trade and construction. In addition to providing royal military stores, Louisiana lumber was processed into boxes for shipment to Cuban sugar factories. As Pontalba noted, more than thirty water powered sawmills supplied materials for this container trade (Davis 1806:130).

Industrial activity continued to be focused along the Mississippi River. Berguin-Davallon's narrative account, written in 1802, noted industrial activity in Cannes Brulees and along the Chapitoulas Coast. The account discussed the nature of riverine enterprise:

> The chief part of these plantations consist of seventy-five sugar houses, established here and there on the river's banks; the other establishments are cotton manufactories, some indigo plantations.... together with mills for sawing wood, and settlements of inferior note, where maize, and rice and potatoes and greens is cultivated (Davis 1806:128).

In all probability, smaller farms at Chapitoulas and Cannes Brulees continued to provide produce for local markets in New

Orleans, while larger plantations, however, concentrated on monocrop agriculture.

Spain and the United States signed the Pinckney Treaty in 1795, granting Americans free navigation of the Mississippi River. New Orleans was designated the port of deposit for regional import and for export trade, and New Orleans and the adjacent river region flourished with the increased volume of American river trade. Although the volume of American trade through New Orleans increased annually, commerce did not focus solely on the Mississippi River. The local inhabitants continued to support extralegal networks with French, English, and American markets; they increasingly moved imported and exported goods through Barataria.

In general, though, the Louisiana colony proved as unprofitable for Spain as it had for France thirty-four years previously. With the signing of the secret Treaty of San Ildefonso in 1800, Louisiana was retroceded to France. Napoleon, who had been unable to establish a naval base in the Caribbean, became fearful that the colony would be captured by the British. Therefore, he agreed to sell the Louisiana Territory to the United States in 1803.

Maritime Context

By 1800, warships and merchant ships had three masts (fore, main, and mizzen), and the number of square sails on the fore and main masts increased from two to four or five. Ship profiles also changed. The heights of the fore and sterncastle were greatly reduced, while the sterns of larger vessels changed from square to round by the early 1800s. After the 1760s, British vessels began to use bronze and copper sheathing below the waterline; the technique was employed by French and American ships starting in the 1790s (Wilson 1983).

The English introduced a new vessel type, the West Indiaman, for trade in the New World. Smaller and faster than the East Indiaman used in the Far East, it became popular in the mid-1700s. Well armed and ship-rigged, it averaged between 150 and 400 tons. Another sailing warship developed during the mid-1700s was the frigate, which carried 20 to 30 guns, a compliment that increased eventually to 50 or 60 (Singer 1998:15).

Other changes in ship design included replacing square-rigged vessels with two-masted brigs, brigantines, and schooners. The schooner appears to have been developed in the Netherlands in the early 17th century and was introduced into the United States later in the century. Because the schooner required a much smaller crew than the earlier larger vessels, the schooner became the most popular American two-masted rig by the end of the 18th century (Singer 1998:15).

The American Period, 1803 to 1860

The 1803 purchase of the Louisiana Territory vastly enlarged the geographic boundaries of the United States, and introduced another set of political, cultural, and social ideas into the lower Mississippi River Valley. During this period, the Jefferson Parish area became a part of the young American nation. Although the parish was not incorporated until 1825, local bodies governed the judicial and civil policies of the parish from 1812, the date of Louisiana's acquisition of statehood. At the end of the ante bellum period, the parish became caught up in the south's secessionist struggle for political and economic independence.

Shortly after the acquisition of the Louisiana territory, the U. S. Government became aware of the need for territorial surveys and for legal ratification of land ownership. Local land owners and occupants were required to register formal claims to their land. Legal ownership of claimed land was granted based on proof of French or Spanish grants, patents, concessions, and orders of survey. In the absence of such a record, proof of continued habitation and cultivation for ten years prior to 1803 provided evidence of ownership. The federally sponsored surveys, plat maps, and registered claims established parish boundaries and local ownership. All unclaimed areas were designated as public

land; these were made available for purchase. After initial surveys, the territory was divided into the Louisiana and Orleans Territories; the latter comprised that portion of the territory south of the thirty-third parallel. New Orleans was named the official port of entry and delivery for the Orleans Territory by the U. S. Congress in 1804. This act accelerated population growth in the area, and it improved commercial opportunities in the region. The following year, the Territorial Legislature divided Orleans into twelve counties; Jefferson Parish then formed part of Orleans County. The county system did not work in Louisiana, and on May 31, 1807, the Legislature passed an act dividing the territory of Orleans into nineteen parishes. The 1807 boundaries of Orleans Parish continued to include the area of modern Jefferson Parish. The transfer of the Louisiana Territory stimulated American immigration into the area, with most incoming settlers attracted by opportunities presented by the new sugar industry in Louisiana.

Sugar cultivation required substantial capital outlays for mills, levees, and slaves. Small planters along the Mississippi River could not compete, and they increasingly began to sell their small holdings to the owners of large plantations or to wealthy speculators who wished to consolidate several small farms into large plantations (White 1944:352). The economic potential of sugar cultivation also increased interest in lands fronting the bayous of Barataria, as well as in the Gulf coast islands. Plantations were established on Bayou Barataria, Bayou des Familles, Grande Terre, and on Grande Isle during the antebellum period. Because of their distance from New Orleans, some of these plantations were held by absentee owners who either resided in the city or who lived on plantations along the Mississippi River.

There also was an increase in illegal trade routed through Barataria during the early nineteenth century. The 1808 congressional ban on the importation of slaves prompted increased smuggling of Africans to labor on Louisiana plantations. This illegal activity was common in Louisiana. Latour (1816) noted:

> from all parts of Lower Louisiana people resorted to Barataria, without being at all solicitous to conceal the object of their journey. In the streets of New Orleans it was usual for traders to give and receive orders for purchasing goods at Barataria.... The most respectable inhabitants of the state, especially those living in the country, were in the habit of purchasing smuggled goods coming from Barataria.

The Barataria privateers, led by Jean Lafitte, stored contraband at several warehouses erected on secluded Baratarian waterways. Little Temple, a marshy point located at the conjunction of Bayous Perot and Rigolettes, was Lafitte's best-known auction site (Swanson 1975:139). The privateers built their operational base on the western tip of Grande Terre. On that island, dwellings, warehouses, slave barracks, and a brick fort overlooked the harbor in Barataria Bay (Swanson 1975:151).

The first territorial governor, William C. C. Claiborne, acknowledged the illegal trade in slaves "through the innumerable bayous which empty to Barataria Bay" (Gayarre 1903:33). Governor Claiborne persuaded the federal militia to raid and destroy the privateers' base at Grande Terre. American forces attacked the island on September 16, 1814, and Lafitte's men abandoned the island, under instructions not to fire upon the American flag (Swanson 1975:152). Lafitte and his corsairs subsequently distinguished themselves at the Battle of New Orleans. Lafitte's willingness and ability to supply General Jackson's troops with arms, ammunition, and reinforcements played a major role in the subsequent American victory at Chalmette. As a result, Claiborne offered pardons to the privateers. Lafitte departed for Galveston; thereafter, little reference was made to smuggling in Barataria.

The second decade of the nineteenth century was one of rapid growth. It was marked by the development of local governmental institutions, by increased commercial activity, and, by the establishment of the first suburbs in what was to become Jefferson Parish. Improved river transportation facilitated the establishment of suburban communities away from urban New Orleans.

The introduction of improved river transportation coincided with Louisiana's admittance to the Union. In 1812, Fulton and Livingston's patented steamboat *New Orleans* traveled down the Mississippi River. Two years later, Captain Henry Miller Shreve's craft *Enterprise* came down the river from Pittsburgh. Unlike the *New Orleans*, the *Enterprise* could travel upstream as well as down. In 1815, Shreve filed suit to break Fulton and Livingston's trade monopoly of steamboats. As a result, the Mississippi River was opened to free travel and shipment in 1819. Steam power permitted more efficient shipment of greater amounts of goods. By the end of the ante bellum period, hundreds of steamboats were plying the Mississippi. Freight costs dropped; the volume of trade in imported and exported goods increased; and, commercial opportunities were opened in previously inaccessible areas.

Conflicts between rural planters and New Orleans urbanites led to the restructuring of Orleans Parish in 1825. Planters from the unincorporated areas of Orleans Parish, largely today's Jefferson Parish, petitioned the State Legislature to separate their district from the City of New Orleans. Formal approval was granted on February 11, 1825; the Third Louisiana Senatorial District was named a separate and distinct parish. A committee appointed members of the new police jury, patterned after that of Orleans Parish. The parish was named for Thomas Jefferson, the third American President, who initiated the Louisiana Purchase.

Suburban residential growth also was spurred by the growth of the railroads. In 1852, the New Orleans, Jackson, and Great Northern Railroad was incorporated, and its planned route prompted Minor Kenner to subdivide his "Pasture" and "Belle Grove" plantations for development. The plans of "Kennerville" show that a railroad depot was to be built there. The railroad eventually ran from New Orleans to Kenner, where it curved northward to Jackson, Mississippi.

A railroad also was established on the west bank during the 1850s. The New Orleans, Opelousas, and Great Western Railroad was incorporated to link Algiers and New Orleans to markets in Texas. Seventeen miles of track had been laid when the railroad's opening was celebrated in 1853. The railroad, as seen in 1858, ran through west bank plantations, crossing the Destrehan and Barataria Canals. Both the east and west bank railroads enlarged the markets for goods produced in Jefferson Parish.

Annual sugar crop tabulations for Jefferson Parish for the years 1850 to 1862 show that the parish's sugar plantations produced an average of 7,668 hogsheads annually (Champomier 1850-1862). The actual yearly numbers varied widely, due to climatic conditions and to flood losses. Champomier's reports noted sugar plantations in Barataria, Grande Isle, Grande Terre, and along the Mississippi River. Jefferson Parish reported thirty steam-powered sugar houses in use during the 1850-51 harvest year; the number had dropped to 24 operating mills by 1862. Most plantations utilized firewood for powering their sugar houses. In addition to granulated sugar, some parish sugar plantations also produced "tafia," a type of rum. Distilleries were being operated L. Millaudon and L. Deschapelle at their west bank plantations (Zimpel 1834).

Extractive industries continued to flourish during the ante bellum period. Proximity to New Orleans assured a constant demand for fish and shellfish from Barataria and from the coastal region. The demand for building materials, fuel, and for naval stores remained unabated throughout the pre-war years, and landowners felled their available forest stands. Sawmills were erected to process the timber, and brickyards were

established that utilized the parish's abundant clay and shell resources.

Thus, the ante-bellum period brought unequalled economic prosperity to Jefferson Parish. Large amounts of capital prompted the development of previously unsettled areas and the introduction of new agricultural and industrial equipment. Local processing of raw materials increased. Large and small scale commercial operations moved locally manufactured goods to regional markets. During this period of prosperity, Jefferson Parish benefited from the economic development of the Mississippi River Valley and of its premier market port, New Orleans.

Maritime Context

The number of ports increased along the Gulf coast during this period to handle increased commercial activity from local sugar plantations, truck farmers, and illegal privateers. Export of lumber, grain, and cotton products also increased the use of vessels throughout the local water systems of the Gulf. The use of raw products from Gulf ports grew along the eastern seaboard and in Europe. A "golden age" of merchant marine shipping developed in the Gulf, wherein new shipping lines developed a shipping triangle connecting Gulf ports to New York and then to Europe (Coggins 1962).

By 1806, a feudal society was taking shape in the larger communities of the coastal region. By 1860, four million slaves had been imported. More than 5,000 boats sailed down the Mississippi River or across the Mississippi Sound from Mobile, Pensacola, the Sabine River, Pensacola, or Galveston to bring cotton to the wharves at New Orleans.

Compared to earlier historic periods, the American Period of maritime history in the Gulf saw major design changes and the development of distinctive regional vessel types. Masted ships were improved to produce swift vessels; shipping eventually became more powerful with the introduction of engine power and steel hulls. The regions of technological innovation were centered in the Chesapeake Bay and in mid-century in New England.

Impetus to improve the swiftness of ships came from an environment of instability surrounding American shores during this time: there was no Navy to protect domestic ships, international conditions were unstable, and smuggling was a profitable trade. Consequently, small, fast vessels were most often employed through dangerous waters. For example, the "West Indies" sloop, developed during the previous period of history, was modified with a schooner rig and with raked masts. From the "West Indies," two further types were developed: one for coastal trade, and the other a larger deep water vessel. By 1820, the larger schooner type became known as the "Baltimore Clipper," and by the mid-1850s, shipyards in Philadelphia, Boston, New York, and other New England yards began building larger clipper ships, some as long as 190 feet. Production peaked between 1853-1854. At the same time, vessels larger than schooners also were being built with more iron and steel. A number of factors brought the production of large clipper ships to a halt, which also ruined the shipbuilding industry in the United States: the Depression of 1857, the Civil War, and competition from the railroads (Wilson 1983).

The Civil War, Reconstruction, and its Aftermath, 1862 to 1890

The War Between the States brought unparalleled devastation throughout the South. Jefferson Parish suffered more economic than physical damage. Although the surrender of New Orleans to Union forces in April, 1862, spared the area from vindictive destruction, the parish could not escape the deep economic and industrial depression that befell the region. Jefferson Parish saw no major military action during the Civil War, but the parish was strategically important to the defense of New Orleans. Confederate sympathy ran high in the parish; the area's predominantly agricultural economy necessitated the continuance of chattel labor.

Several Army camps were constructed in the parish to defend New Orleans, first from Union troops, and, after 1862, from the Confederacy. Camps Lewis and Parapet were

established on the east bank below and above Carrollton, respectively. Because of the strategic importance of Jefferson Parish to the defense of New Orleans, Confederate troops were brought in and stationed at Camps Lewis and Parapet; they also erected Fort Banks to provide crossfire with Camp Parapet. In addition, 3,000 men were billeted at the Metairie Race track by May of 1861. Confederate troops seized the incomplete Fort Livingston, and converted the U. S. Marine Hospital at McDonoghville to a powder magazine. Defensive earthworks were constructed along the Company Canal on the west bank, and between Camp Parapet on the river and Star Redoubt on Metairie Ridge.

During the post war years, agriculture remained the primary economic base of the parish, but the nature and characteristics of production were altered substantially. The ante bellum pattern of independent and self-sustaining plantations evolved into a system of corporate-owned and consolidated sugar factories. The lack of capital and of slave labor following the war prompted this consolidation of agricultural and industrial facilities. Between 1870 and 1890, the number of sugar houses in operation in Jefferson Parish dropped from twenty-five to five. Sugar production levels increased, however, due to improved efficiency in cultivation and refinement. Although a number of plantations did continue to grow cane, their annual crops were sold to centralized processing factories. Total farm acreage in Jefferson Parish decreased about 13,000 acres between 1870 and 1890; by 1900, farm acreage had dropped over thirty-eight percent from 1860 levels.

The post-bellum period also was characterized by an effort to rebuild industry. The nature and foci of commerce, agriculture, and manufactures remained virtually unchanged, but industrial patterns and technological processes became increasingly centralized and mechanized. Corporate ownership replaced family-based cottage industry. After a short period of inactivity following the war, transportation systems were enlarged and improved. Rail shipment began to supplant river-borne transportation. The years between 1860 and 1890 were a prelude to the post-1890, parish-wide trend towards urbanization and industrialization.

In general, the inhabitants of Jefferson Parish supported the ideology and goals of the Confederacy. Planters' fortunes were dependent on their success as agriculturalists; the capital and labor intensive sugar economy of the parish depended on slavery. As a result, Jefferson Parish quickly responded to the Confederacy's call for arms and men. Captain Guy Dreux organized the Jefferson Mounted Guards on December 13, 1860. Dreux commanded seventy men from Jefferson Parish; this company acted as escort to General P.G.T. Beauregard and the Army of Tennessee (Swanson 1975:93).

Forts Livingston and Little Temple were captured by Union troops prior to the fall of New Orleans. Before the end of 1861, Federal troops had blockaded the Gulf Coast. As a result, smuggling through the Barataria waterways was revived. Early in 1862, Commodore David Farragut launched an attack against Forts St. Philip and Jackson, and forced his way upriver after five days of shelling. Farragut demanded and received the surrender of New Orleans on April 25, 1862. At the beginning of May, Major General Benjamin F. ("The Beast") Butler and his troops arrived to occupy the city. All Confederate encampments in Jefferson parish were taken over by Union forces. Because of Camp Parapet's importance to the western defense of the city, Federal troops constructed Fort Banks on the west bank to provide crossfire on the river with Camp Parapet. Louisiana was readmitted to the Union in July, 1868. This readmission officially ended military rule, but the state remained under the jurisdiction of General Sheridan's Fifth military District until 1877. Federally supported troops occupied New Orleans and other major Louisiana cities until that date.

After the occupation of New Orleans, sugar farming became virtually impossible. In addition to low prices and to difficulties in marketing, credit was almost non-existent. Slaves ran off to the 11 contraband camps.

Some planters switched to subsistence farming; others gave up and rented their lands (Begnaud 1980:38-39; Goodwin and Yakubik 1985). After the war, many planters lost their plantations due to continued financial difficulties. Prior to the war, the largest sugar crop made in the state was that of 1861. For most of the remainder of the nineteenth century, sugar production did not even approach the scale obtained during the ante bellum high.

The entire sugar industry remained stagnant during the early 1870s, Individual and total sugar crop yields continually dropped during the first half of the decade. The "Panic of 1873" depressed sugar prices, and Louisiana plantations suffered short crops during these years. Despite the unprofitability of old production methods, Jefferson Parish sugar planters sought to revive the sugar industry replacing slave labor with wage labor. This was evidenced by the reestablishment of sugar houses on individual plantations. A substantial recovery occurred during the second half of the 1870s (Sitterson 1953: 251), and crop statistics showed a steady increase in production after 1875. Labor shortages and high wages still limited cultivation and production levels, but technological advances improved per acre yield. Vacuum pan apparatuses were utilized more frequently during the post war years. The centrifuge came into general use at that time, as did the steam tram.

In a real sense, rice was the appropriate crop to plant after the War Between the States. While water from un-maintained levees ruined cane, it was necessary for rice cultivation. Census agricultural schedules for Jefferson Parish chronicle the increase in rice production during the post bellum years. The crop records report that 269,620 pounds of rice were grown in 1870, 825,774 pounds were grown in 1880, and 1,774,394 pounds were grown in 1890. These numbers indicate a tremendous increase in rice production over a twenty year span. Clearly, rice agriculture was a profitable alternative to cane cultivation, although the latter never was abandoned.

In fact, production of sugar continued to increase after 1875, and a dramatic industrial change became evident in Jefferson Parish by 1885. As early as 1874, Bouchereau advocated the establishment of a central sugar factory system in Louisiana, stating "Let the sugar factories be established in different neighborhoods and let the producers of the cane sell it to the factory" (Bouchereau and Bouchereau 1874:xiixiii). The benefits of this system were obvious; the greatest labor expenditure was in the actual manufacturing of sugar from cane, and the centralized system helped to alleviate labor difficulties. It also assisted the planter who did not have the capital to rebuild his sugar house, and, it allowed small scale planters to produce sugar without incurring the cost of a mill. A centralized processing system was in operation by the second half of the 1880s. Bouchereau's crop statements additionally noted increasing mechanical and technological sophistication in the Jefferson Parish sugar industry during this decade. The number of vacuum pan apparatuses increased; the previously dominant, but less efficient, open kettle declined in number.

Barataria continued to be utilized for shipping during the post bellum period. Lockett (1969:130) noted the most frequently utilized routes between Barataria Bay and New Orleans immediately after the war:

> By Bayou St. Denis or Grande Bayou from the northwest corner of the bay to Little Lake, thence by Bayou Perot to Lake Ouasha [now Lake Salvador], and thence by canal to the river nearly opposite Carrollton, the whole distance being about sixty-five miles and the depth of water never less than four feet.
>
> From the north end of the bay Wilkinson's Bayou leads eastward towards the Mississippi and connects through a canal with the river at a distance of thirteen miles.

> Four feet can be taken through this route.
>
> Eight miles from the bay, Smugglers Bayou joins Wilkinson's Bayou and thence leading parallel to the river joins Barataria Bayou in a distance of twenty miles. Through this route four feet can be carried. Several other smaller bayous connect through canals with the river from the bayous just named.
>
> From the head of Little Lake about fifteen miles from Barataria Bay, Bayou Rigolets leads to the northward joining Bayou Barataria, of which it is the extension in a distance of nine miles and about eighteen miles from New Orleans by the latter bayou. Barataria Bayou is connected with the river by several canals, and from four to five feet may be taken through the bayou and the principal canals (Lockett 1969:130).

According to Harris (1881:165), the Bayou Barataria route was "strongly urged as the most desirable outlet for the shipping from New Orleans ... prior to the construction of the southpass jetties" on the Mississippi.

A significant addition to the settlement of Barataria was the establishment of platform villages. These small fishing and fish processing communities were composed primarily of Filipinos and Chinese. Narrow plantations and farms continued to line the banks of Bayous Barataria and des Familles. South of these were the "resorts of fishermen and duck hunters" (Harris 1881:165). Attempts to develop a tourist industry in Jefferson Parish began immediately following the Civil War. Although Henry Chaplon successfully grew cotton and sugar at Grand Isle, the surf and sandy beaches attracted resort seekers. Former plantation structures were converted into tourist accommodations during the late 1860s by Joseph Hale Harvey and Benjamin Marhot. In order to improve business on his Harvey Canal and on Grand Isle, Harvey advertised steamer excursion trips to the Grand Isle Hotel.

Larger hotel structures were built during the 1880s. In 1888, P. F. Herwig purchased lots on Grand Isle and built the Hotel Herwig (Evans *et al.* 1979:87). The steamers *Grand Isle* and *Joe Webre* brought vacationers to Joseph Krantz's resort; Krantz introduced gambling to Grande Isle. In 1889, a business consortium headed by Krantz began construction of the New Orleans, Fort Jackson, and Grand Isle Railroad; the rail line cut travel time from New Orleans, and dramatically increased the island's tourist business. The Ocean Club was completed in 1892; this 160 suite hotel offered gambling, billiards, surf-bathing, tennis, and an observatory (Evans *et al.* 1979:89). The "grand resort" period of the island's history came to an end in 1893; a hurricane, headlined as the "Wind of Death," swept over Grand Isle, destroying all residential and tourist structures.

Maritime Context

During the Civil War, normal commerce stopped in the Gulf of Mexico because of the Federal naval blockade imposed on Southern ports, and because bigger profits were to be made by illicit traders running the blockade. The Civil War also spurred the development of new ship types. The older coastal shipping vessels disappeared, and new, swift, low-silhouetted sailing schooners and steam vessels appeared. These were designed to make quick runs from Havana, Bermuda and Nassau for Brownsville, Galveston, New Orleans, Tampa and Mobile. The illicit commerce of the Civil War came to a close when the war ended (Coggins 1962). Confederate blockade runners were occasionally run aground by Union ships. One of the most important naval conflicts of the war, between the Union Monitor and the Confederate Merrimac, marked the end of wooden warships and the introduction of ships sheathed in iron (Coastal Environments, Inc. 1977).

After the war and the period of reconstruction in the Southern States, commercial shipping again appeared along the Gulf coast, but this time with a large foreign element. The new post-war traffic moved along coastal and direct routes to South America, Europe, the Caribbean and the eastern U.S. markets. New York no longer controlled the Gulf's commerce (Laing 1974). Although coastal maritime transportation was restricted by law to U.S. vessels during the latter part of the 19th century, the American merchant marine never recovered its pre-Civil War status, due to lost markets, and increased costs coming from insurance, crews, and ship building. A greater-share of Gulf trade was captured by foreign merchants, who defined new traffic patterns to Gulf ports starting in 1885.

After the Civil War, shipyards in New England took the lead in developing and perfecting the "down-Easters" by 1885. They were over 190 feet long, but carried less sail than the clippers, had stronger sheer, and bore less decoration. But by 1900, they too were replaced by the newer technology of steamers, railroads, and smaller schooners that carried on coastal trade (Wilson 1983). In the Gulf, small coastal vessels (rigged as a sloop, schooner, brigantine or brig) carried on trade with other ports of the United States.

The large amounts of timber being produced in Gulf States were largely exported in schooners, some reaching 300 ft in length. With the introduction of iron and steel in shipbuilding, composite vessels of metal frames with wooden decks and masts were produced. The first iron-hulled schooner appeared in 1880. Completely wooden ships were still being built until World War I, when the demise of sailing craft occurred. Coastal trade was carried on in wooden schooners until after World War I, because they were inexpensive to build and maintain (Wilson 1983).

Until the competitiveness of railroads destroyed much of sailing's attractiveness, passenger ships were considered more comfortable, faster, safer, and cleaner than wagon travel. Sailing passenger vessels remained popular until the last quarter of the nineteenth century (Wilson 1983).

Urbanization and Industrialization, 1890 to 1945

The period between 1890 and 1945 was characterized by the increasingly rapid urbanization and industrialization of Jefferson Parish. During this period, transportation systems and industry in the parish developed interdependently. Railroad lines and revived river traffic stimulated industrial growth within the parish, and government also supported the development of manufacturing and storage facilities. The establishment of a modern barge system, and the inclusion of the parish in the Port of New Orleans, further strengthened economic and commercial links between the city and Jefferson Parish. Communities grew along the watercourses and at rail depots, particularly on the west bank of Jefferson Parish, stimulated by the maritime, lumber, and transportation industries of the parish. Conversely, a regressive agricultural pattern developed throughout the parish, as large plantations were broken into smaller truck farms.

Twentieth century manufacturing followed traditional extractive patterns. However, increasingly mechanized production enabled the processing of much greater amounts of raw materials. Lumber mills and other attendant wood product factories were erected at previously developed timber processing sites. The growth of the Louisiana Cypress Company is Jefferson Parish's best example of this industry's expansion. In 1889, Joseph Rathborne established the first large-scale industry in the Harvey area. This extensive cypress logging and lumber business remained prominent until it closed in 1929. Ranked as the world's largest cypress mill in 1897, the company owned 50,000 acres of Barataria swamp forest (Swanson 1975:117). It employed pushboats to transport felled timber from the logging canals to riverfront processing centers. Lumbering in Barataria continued into the twentieth century.

Other traditional extractive industries in Barataria persisted during the twentieth century. The rationed shortages of cotton during World War II necessitated the revival of the Spanish moss industry. Spanish moss was harvested, processed, and sold for stuffing material. Small factory sites at Gretna and Crown Point cured and ginned the native epiphyte for sale to furniture manufactures; during the war, moss brought as much as five cents a pound (Swanson 1975:138).

The fur industry in Barataria also expanded during the twentieth century. Prior to the turn of the century, hunting pelts was an occupation of independent trappers. Louisiana pelts were exported primarily to the European market. Muskrat brought only a few cents per pelt; these were less desirable than the more spectacular pelts obtained in the North. By the turn of the century, the American market was taking a more active interest in furs. Less valuable pelts, such as muskrat, were sold as "Hudson Bay Seal," or "Southern Mink." Prices rose to as high as $2.50 a pelt. In 1937, the nutria was introduced to the state, providing another source of pelts.

A variety of land development corporations began to acquire and/or to lease public lands in the Barataria region during this period. These included the Louisiana Land and Exploration Co., a Maryland corporation; the Barataria Land Co.; the Louisiana Meadows Co.; and, the Madison Realty Co. Some of these corporations, such as the Nylka Land Co., Ltd., were interested primarily in land reclamation and improvement.

Food processing sites were established throughout the parish during this period. Vegetable packing, canning, and shipping plants were located at Kenner, because of its proximity to both transportation avenues and to truck farms. The village of Harvey slowly developed during the early twentieth century, as a result of its early association with the fishing industry. Fishermen and shrimpers from lower Jefferson Parish thereafter utilized processing factories built along the Harvey Canal. This linear industrial pattern was spurred by the same factor that had prompted earlier industrial growth along the Mississippi: access to transportation. Seafood processing continued in the Barataria region, primarily by residents of the nineteenth century platform villages. Shrimp was dried and canned for export sale; a shrimp factory was located on Fifi's Island, southwest of Barataria Pass. These industrial sites were isolated; they were occupied primarily by Chinese and Filipino immigrants (Goodwin and Yakubik 1985).

The agrarian economy of Jefferson Parish underwent noticeable change during the period; these changes were evident particularly after World War I. Although the parish's improved acreage largely was used for agriculture until the onset of World War II, the parish's sugar industry declined rapidly in favor of truck farming, and the previously described industrial trend towards consolidation and centralization reached its culmination near the end of World War I. The former sugar estates located along Barataria waterways were subdivided into smaller truck farms, cultivated by individual families. These vegetable and dairy farms provided produce for local and regional markets, as small farms did prior to sugar's zenith in the parish. Jefferson Parish produce was sold in local markets and processed for regional distribution. This regressive and unconsolidated agricultural pattern reflected the increased regional emphasis on industrial development, as well as the reduction in cane cultivation and sugar production.

River-borne freight tonnage decreased dramatically between 1890 and 1910, because railroad transport offered a more efficient and less expensive means for shipping large volumes of freight. Jefferson Parish became a regional hub for rail-shipped goods during this period. Both the east and west banks of Jefferson Parish became intricately linked to rail markets throughout the south, southwest, and the entire Mississippi River valley. The Illinois Central Railroad crossed the east bank of the parish en route to its terminus at New Orleans. The Texas and Pacific Railroad and the Southern Pacific Rail lines served the parish's west bank. Spur lines connected

small communities and industrial facilities to main trunk lines.

In 1888, a Congressional act-provided for Jefferson Parish's inclusion in the U. S. Customs District headquartered at the New Orleans Port of Entry. This legislative action officially recognized the parish's commercial importance to the Port of New Orleans. The parish was represented on the state-supported Board of Commissioners for the Port; parish transportation and storage facilities eventually were integrated into the larger port operation system.

In 1900, the state legislature authorized construction of the New Orleans' Public Belt Railroad. This track connected private rail lines to wharves at the river. The rapid growth of the Public Belt System revived plans for a trans-Mississippi railroad bridge by 1914. The state legislature granted the port the "right and power to construct a tunnel or bridge over the river near New Orleans," in 1916. Work began on the bridge with the driving of pilings in late 1925. Further construction did not take place until late 1932. The Public Belt Railway Bridge, later renamed the Huey P. Long Bridge, was dedicated in 1935.

The post-World War I revival in the barge shipment industry boosted the volume of commercial activity associated with the Mississippi River. Public wharves in Jefferson Parish expanded storage and transfer capacities of the Port of New Orleans. Storage elevators in Jefferson Parish contributed to New Orleans' status as the world's largest grain port. In 1892, the Texas and Pacific grain elevators at Westwego had a 300,000 bushel capacity; in combination with the granary at Southport, Jefferson Parish afforded the port a total grain storage capacity of one million bushels. Oil storage facilities were built in the parish after petroleum exploration began in the late 1930s.

The population of Jefferson Parish in 1980 was 454,592, with a growth rate in population at sixty per cent for the remainder of the century. Investment in the parish reached new highs in the boom years 1978 and 1980; in each of these years, industrial investment in the parish approached one hundred million dollars.

Maritime Context

The 20th century was marked by greatly improved ground transportation systems, including rail and auto, which substantially decreased the need to transport goods by vessel. At the same time, there was an increase in the regional or local use of intercoastal waters. The greatest changes in maritime technology during this period centered on the increased use of engine power after 1916, and the use of steel-hulled vessels. Engine power replaced the power of sails, a process that was completed by 1975 (Wilson 1983). Modern types of water transport came to dominate the waters, including barges, harbor boats, steamers, and fishing vessels. With the demise of sea borne Gulf coast trade, an increase in the regional or local use of intercoastal waters developed for purposes that were both economic and recreational.

The commerce of war gave way to a return to peace time maritime activities that employed large vessels to these Gulf ports to carry goods in large quantities at lower transport costs. For reasons of economy, "deep water" became an issue for the competing ports of the coastal states that wanted channels deepened so that large vessels could sail through shallow waters. Dredging changed the character of sea routes leading to ports: passes were modified, new ones cut, and old ones allowed to fill as natural harbors and channels were altered to accommodate post-World War II demands of maritime commerce and technology. These sea route modifications have meant a greater occurrence of historic shipwrecks in waters further from the Gulf shore. The larger vessels required by the growing ports became more restricted to specific entrance channels, and less natural navigable water was open to them along the shallow coast. Ships that strayed too far from open fairways or dredged channels often were wrecked. Nevertheless, shipping routes for in-Gulf commerce remained the same as those developed in the period of 1820 to 1899 (Coastal 1977).

CHAPTER IV

RESEARCH METHODS: ARCHIVAL AND ARCHEOLOGICAL

Archival Investigations

Archival research for the Barataria Pass project focused on development of appropriate historic contexts and on identifying previously recorded sites of shipwrecks and other obstructions. Literature on shipwrecks, Mineral Management Service's "Shipwrecks Contained in Lease Blocks" and Shipwrecks Found in State Waters," AWOIS (Automated Wreck and Obstruction Information system), U.S. Coastal and Geodetic Service nautical charts, Omega Version Bottom Contour Chart, historic maps, U.S. Army Corps of Engineers reports, vessel directories and archeological reports of previous investigations within the vicinity of the Barataria Pass project area were researched at the Library of Congress in Washington, D.C., at the National Archives in Washington D.C., and at College Park, Maryland, at the Louisiana Department of Culture, Recreation, and Tourism, and in the library of R. Christopher Goodwin & Associates, Inc. Individual histories of recorded shipwrecks were researched at the National Oceanic and Atmospheric Administration, Silver Spring, Maryland.

Maps (U.S. Coastal and Geodetic Service)

Federally produced maps (Catalogue of Charts and Coast Pilots) at the National Archives and Library of Congress include surveys of ocean features beginning in the 1860s and continuing to the present. These maps are intended to guide ships through waterways by marking depths, given in fathoms, and buoy positions. The listing of wrecks and other obstructions, such as piles and dumping areas, began in the 1930s. The most complete nautical charts by the U.S. Coast and Geodetic Survey are the current charts, which detail every observable feature that may prove hazardous to ships.

Charts for the Gulf of Mexico

Chart No.1007-A is a U.S. Coastal and Geodetic Service chart listing sites of World War II sunken vessels in the Gulf of Mexico. Although this chart is described as listing World War II wreckage, some of the sites are described as having been located before the 1940s. Prepared by the military in 1942, the chart listed 51 wrecks. Vessel information on the map includes name, nationality, type of ship, location of sinking, other locations given for the sinking, whether the wreck had a buoy placed over it, depth wreckage lies in, and item number for each vessel. Most of the military wrecked vessels sited in Chart No. 1007-A are found along the Gulf coasts, near ports. A few are listed in deep water.

Federal Record Groups contain information pertinent to shipwrecks in the Gulf. Pertinent Record Groups are: *RG41,* established in 1854, the Records of the Steamboat Inspection Service continue into the 20th century.

RG26: the Records of U.S. Coast Guard, are bound volumes of abstracts of wreck reports received from Collectors of Customs

from 1874 to 1975, and original reports from 1908 to 1913. This record group also contains Reports of the U.S. Life-Saving Service. A microfilm copy of annual tables of reports of the Life-Saving Service is available for the years 1876 to 1914.

RG35: the Records of U.S. Custom Service, documents wrecks after 1874 in which year Congress passed a law requiring owners of American vessels to report any casualty to the vessel to the Collector of Customs at the port at which the vessel was documented. One copy of the report was forwarded to the United States Life-Saving Service, and one copy usually was copied into volumes.

RG36: contain the volumes of copied casualty reports of the U.S. Customs Service. *Microfilm T-920:* contains the U.S. Coast Guard assistance rendered reports for the years 1916 to 1940. *Microfilm T925* contains Customs wreck reports from 1913 to 1939.

Microfilm T926: is an indexes to U.S. Coast Guard Casualty and Wreck Reports, as well as the Life-Saving Service assistance-rendered reports. Reports of the U.S. Life-Saving Service are another source of shipwreck information. This service began in the Revenue Marine Division of the Treasury Department in 1871, and eight years later came under a general superintendent who reported directly to the Secretary of the Treasury. Regulations required Keepers of Life-Saving Stations to report assistance rendered by their stations to any vessel, crew, or person and sent the originals to the General Superintendent of the service. The stations retained a copy of the reports. Annual reports of the Life-Saving Service contain narrative reports of services and tables of casualties occurring near life-saving stations. A microfilm copy of these tables is available for the period 1876 to 1914. An act of January 28, 1915, established the U.S. Coast Guard by consolidating the Department of the Treasury's Revenue-Cutter and Life-Saving Services. Perhaps for this reason, Coast Guard records include copies of Life-Saving Service assistance-rendered reports for the period 1901 to 1915. These are arranged by fiscal year by Life-Saving Service district. Also with the Coast Guard records are microfilmed copies of assistance-rendered reports for the period 1916-1940. These are arranged by date of casualty in two groups: reports of assistance rendered and reports of miscellaneous services rendered. These 1916 to 1940 reports are available on National Archives Microfilm T-920; like the customs wreck reports, they are indexed on National Archives Microfilm T-926. Other federal records also have shipwreck or associated maritime information, and some shipwreck data can be found in records of the Lighthouse Service (Records Group 26).

<u>Merchant Vessels of the United States</u>. This principal directory for American vessels began to be published by various government agencies in 1867; currently it is updated by the U.S. Coast Guard. The Merchant Vessels directory annuals contain names of shipping vessels under type of vessel (sailing, steam, unrigged, yachts, etc.), with details on rig, tonnage, dimension, when and where built, home port, and owner. Also listed is information on abandoned or lost vessels. The principal directories produced abroad are: *Lloyd's List 1740-1970* of vessel movements and casualties reported to Lloyd's; microfilm index to the list cover the years 1838 to 1926, and beginning in 1927 there is a card for each vessel's reported movements and casualties. *Lloyd's Weekly Shipping Index 1880-1917* lists the published voyage and engaged date of sailing for ocean going steamers and sailing vessels, as well as all casualty reports published during the previous week. *Lloyd's Missing Vessel Books 1873-1954* contains records of all vessels posted missing by the Committee of Lloyd's, incorporating details of vessels, masters, crews, voyages, and cargo. *Lloyd's Marine Loss Records 1939-1970* gives details of all vessels lost, with full reports as received at Lloyds.

The following books containing shipwreck lists also were examined as corroborative evidence for other sources examined for this report:

Beneath the Waters: A Guide to Civil War Shipwrecks (Hemphill 1998);
Encyclopedia of American Shipwrecks (Berman 1972);
A Guide to Sunken Ships in American Waters (Lonsdale and Kaplan 1964);
Merchant Steam Vessels of the United States, 1790-1868 ("The Lytle-Holdcamper List" 1975);
Way's Packet Directory, 1848-1994 (Way, Jr. 1983);
Way's Steam Towboat Directory (Way, Jr. 1990);
Wreck List Information (Hydrographic Office, U.S. Navy 1945).

Archeological Investigations

The Barataria Pass ODMDS marine remote sensing survey was conducted from a 48 ft crew boat leased from Kevin Gros Consulting and Marine Services, Inc., and captained by Mr. Denis Debou. The project area consisted of a continuous survey block which was divided into 29 parallel track lines spaced at 100 ft (30.7 m) intervals. The survey block measured 2,538.2 –ft (773.7 m) x 19,776.5–ft (6,028 m), for a total of 1,152.4 acres. This block was formed by the following coordinates:

NW Corner
29°16'10" N x 89°56'20"W,
NE Corner
29°14'19"N x 89°53'16" W,
SW Corner
29°16'29" N x 89°55'59" W,
SE Corner
29°14'00" N x 89°53'36"W.

Remote sensing survey was designed to identify specific magnetic or acoustic anomalies and/or clusters of anomalies that might represent potentially significant submerged cultural resources, such as shipwrecks. The natural and anthropogenic forces that form such sites typically scatter ferrous objects like fasteners, anchors, engine parts, ballast, weaponry, cargo, tools, and miscellaneous related debris across the river bottom. These objects normally can be detected with a marine magnetometer, side scan sonar system, and fathometer that record anomalous magnetic or acoustic underwater signatures that stand out against the ambient magnetic or visual field. Two critical elements in the interpretation of such anomalies, which may also result from natural or modern sources, are their patterns and, in the case of magnetic anomalies, their amplitude and duration. Because of the importance of anomaly patterning, accurate recording and positioning of anomaly locations is essential. The equipment array used for the Barataria Pass ODMDS survey included a DGPS, a proton precession marine magnetometer, a side scan sonar, and a fathometer (Figure 10). Data were collected and correlated via a laptop computer using hydrographic survey software.

Positioning

A Differential Global Positioning System (DGPS) was used to direct navigation and to supply accurate positions of magnetic and acoustic anomalies. The DGPS system consisted of a Northstar 941XD with internal DGPS. The Northstar 941XD transmitted position information in NMEA 0183 code to the computer navigation system (version 7.0 of Coastal Oceanographic's *Hypack* software). *Hypack* translates the NMEA message and displays the survey vessel's position on a computer screen relative to the pre-plotted track lines. During post-processing, *Hypack's* positioning files can be utilized to produce track plot maps and to derive the X, Y, and Z values used to produce magnetic and bathymetric contour plot maps. Positioning control points were obtained continuously by *Hypack* at one-second intervals. During the course of the survey, strong differential signals were acquired with a minimum noise to signal ratio.

Magnetometry

The recording proton precession marine magnetometer is an electronic instrument used to record the strength of the earth's magnetic field in increments of nanoTeslas or gammas. Magnetometers have proven useful

in marine research as detectors of anomalous distortions in the earth's ambient magnetic field, particularly distortions that are caused by concentrations of naturally occurring and manmade ferrous materials. Distortions or changes as small as 0.5 gammas are detectable when operating the magnetometer at a sampling rate of one second. Magnetic distortions caused by shipwrecks may range in intensity from several gammas to several thousand gammas, depending upon such factors as the mass of ferrous materials present, the distance of the ferrous mass from the sensor, and the orientation of the mass relative to the sensor. The use of magnetometers in marine archeology and the theoretical aspects of the physical principals behind their operation are summarized and discussed in detail in Aitken (1961), Hall (1966, 1970), Tite (1972), Breiner (1973), Weymouth (1986), and Green (1990).

Individual anomalies produce distinctive magnetic "signatures." These individual signatures may be categorized as 1) positive monopole; 2) negative monopole; 3) dipolar; or 4) multi component (Figure 11). Positive and negative monopolar anomalies usually indicate a single source, reflecting either a positive or negative deflection from the ambient magnetic field, depending on how the object is oriented relative to the magnetometer sensor and whether its positive or negative pole is positioned closest to the sensor. Dipolar signatures display both a rise and a fall above and below the ambient field; they also are commonly associated with single source anomalies, with the dipole usually aligned along the axis of the magnetic field and the negative peak of the anomaly falling nearest the North Pole.

Especially important for archeological surveys are multi-component anomalies. Multi-component or complex signature anomalies consist of both dipolar and monopolar magnetic perturbations associated with a large overall deflection that can be indicative of the multiple individual ferrous materials comprising the debris patterns typically associated with shipwrecks. The complexity of the signature is affected partially by the distance of the sensor from the debris, and by the quantity of debris. If the sensor is close to the wreck, the signature will be multi component; if far away, it may appear as a single source signature.

A Geometrics G866 proton precession marine magnetometer was used to complete the magnetic survey of the Barataria Pass ODMDS project area. The G866 is a 0.1 gamma sensitivity magnetometer that downloads magnetic data in digital format as numeric data files in *Hypack*. As the magnetic data are being collected, *Hypack* attaches the precise real-time DGPS coordinates to each magnetic reading, thus ensuring precise positioning control. The magnetometer was towed far enough behind the survey vessel to minimize the associated noise, which generally measured less than two gammas. A float was attached to the magnetometer sensor, so that a consistent depth below the water's surface could be maintained.

Acoustic Imaging

Over the past 25 years, the combined use of acoustic (sonar) and magnetic remote sensing equipment has proven to be the most effective method of identifying submerged cultural resources and assessing their potential for further research (Hall 1970; Green 1990). When combined with magnetic data, the near photographic-quality acoustic records produced by side scan sonar systems have left little doubt regarding the identifications of some targets that are intact shipwrecks (Figure 12). For targets lacking structural integrity or those partially buried beneath bottom sediments, identification can be extremely difficult. Because intact and exposed wrecks are less common than broken and buried wrecks, remote sensing surveys generally produce acoustic targets that require ground-truthing by divers to determine their identification and historic significance.

An Imagenex color imaging digital side scan sonar system was utilized continuously during the Barataria Pass ODMDS survey to produce sonograms of the river bottom on each transect within the project area. The

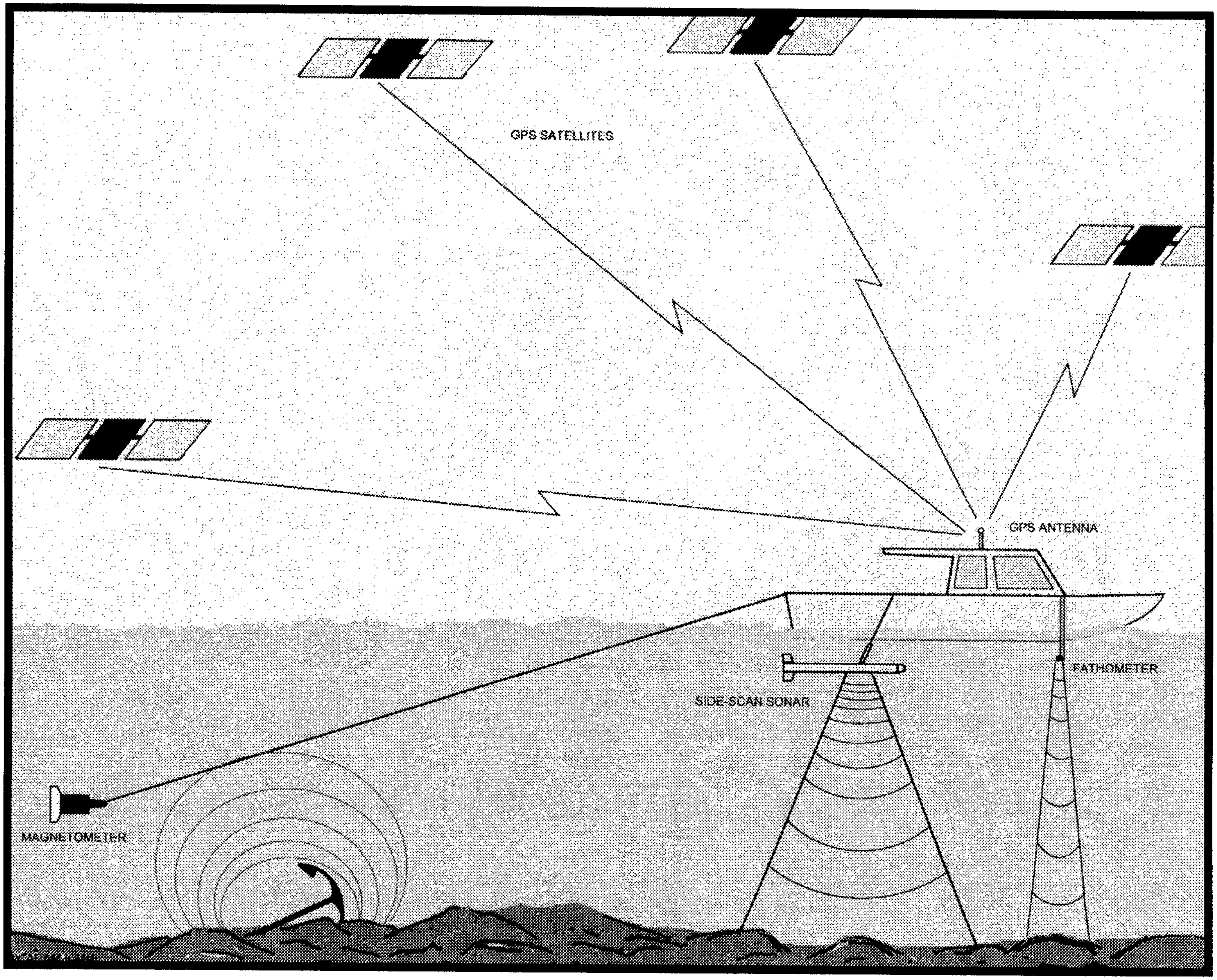


Figure 10. Remote Sensing Equipment used for survey – DGPS, Magnetometer, Side Scan Sonar, and Fathometer

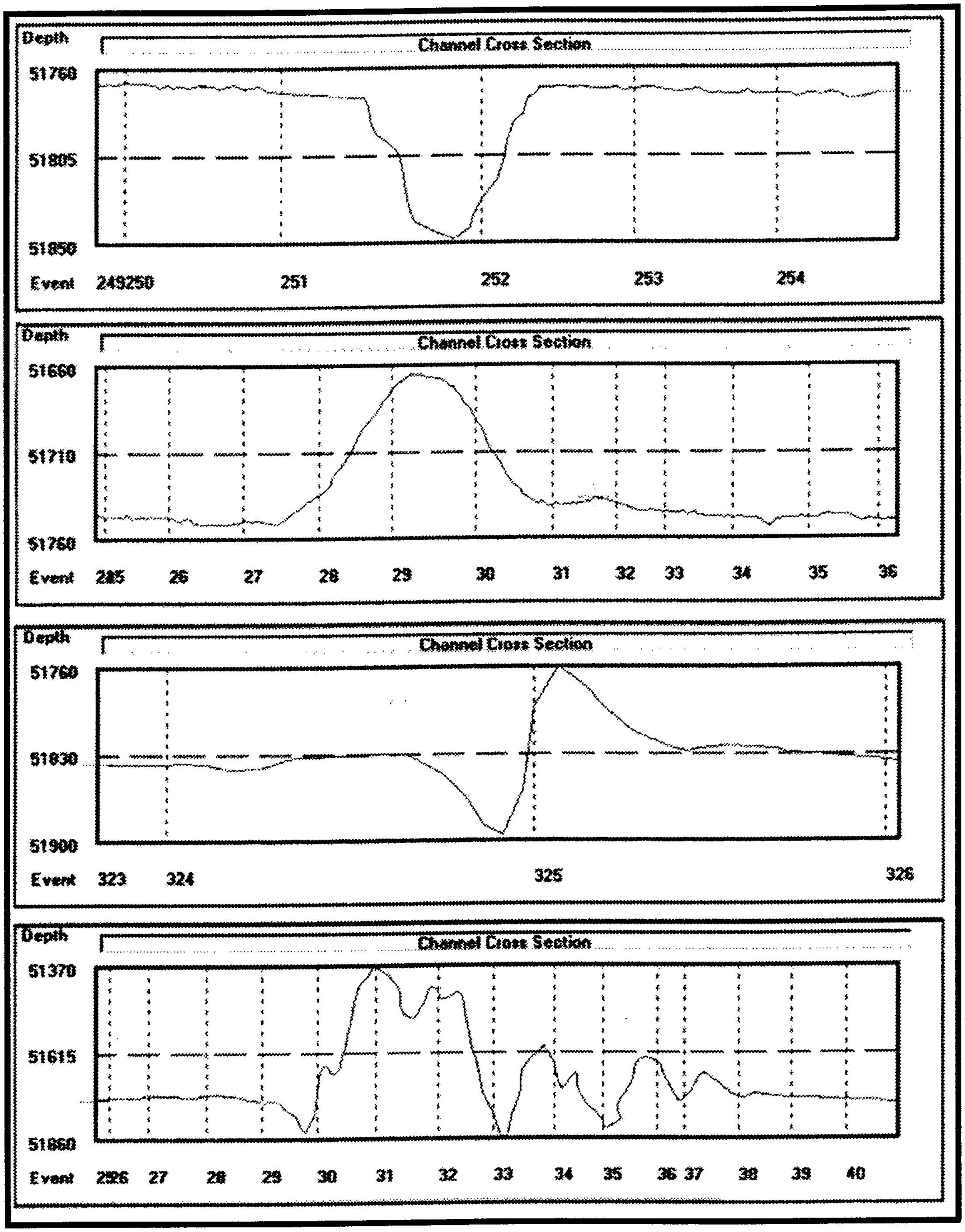


Figure 11. Example of Magnetic Signatures – positive monopole (top), negative monopole, dipolar, multi-component (bottom)

Figure 12. Example Acoustic Image of shipwreck

Imagenex system consisted of a Model 858 processor coupled with a Model 855 dual transducer tow fish operating at a frequency of 330 KHz. The sonar was set at a range of 90 ft per channel, which yielded overlapping coverage of the study areas. Sonar data were recorded in a digital format on a 1 GB 3.5 in Iomega Jazz cartridge. A stream of time-tags was attached continuously to the sonar data to assist in post-processing correlation of the acoustic and magnetic data sets. Acoustic images were displayed on a VGA monitor as they were recorded during the survey, and an observation log was maintained by the sonar technician to record descriptions of the anomalies and the times and locations associated with each target. Potential targets were inventoried both during the survey and in post-processing.

Survey Control and Correlation of Data Sets

The *Hypack* survey software provided the primary method of control during the survey. Survey lanes were planned in *Hypack*, geodetic parameters were established, and instruments were interfaced and recorded through the computer software. During the survey, the planned survey lines were displayed on the computer screen, and the survey vessel's track was monitored. In addition to providing steering direction for the helmsman, *Hypack* allowed the surveyors to monitor instruments and incoming data through additional windows on the survey screen.

All remote sensing data were correlated with DGPS positioning data and time through *Hypack*. Positions for all data then were corrected through the software for instrument layback and offsets. Positioning was recorded using Louisiana South State Plane grid coordinates, referencing the North American Datum of 1983 (NAD-83). The GRS-1980 ellipsoid was used, along with a Lambert projection.

Remote Sensing Data Analysis

Magnetic and acoustic data were analyzed in the field while they were generated, and post-processed using *Hypack* and Autodesk's *AutoCAD* computer software applications. These computer programs were used to aid assessment of the signature, intensity, and duration of individual magnetic disturbances, and to plot their positions within the project area.

In the analysis of magnetometer data for this survey, individual anomalies were identified and carefully examined. First, the profile of each anomaly was characterized in terms of pattern, amplitude, and duration. Magnetic data were correlated with field notes, so that deflections from modern sources, such as channel markers, could be identified. Although all anomalies with an amplitude greater than ten gammas were given a magnetic anomaly number for reference purposes, anomalies of larger amplitude (more than 50 gammas) and of longer duration (more than 20 seconds) generally are considered to have a higher likelihood of representing possible shipwreck remains, especially when such anomalies cluster together. Side scan sonar data were examined for anomalous acoustic targets and shadows that might represent potentially significant submerged cultural resources, and to correlate with any magnetic or bathymetric anomalies.

The methodology employed during the survey produced favorable results, with reliable DGPS signals, low noise levels on the magnetometer, and clear acoustic images. All positioning and remote sensing equipment performed reliably throughout the survey. Regular and evenly spaced coverage of the entire survey area was achieved.

CHAPTER V

PREVIOUS INVESTIGATIONS

Introduction

The present chapter provides background contextual information about previous archeological and architectural investigations completed within the general vicinity of the project area. This information was sought in order to ensure that any previously recorded cultural resources situated within the current study area were relocated during fieldwork. The chapter is divided into three sections. The first contains a review of previous cultural resources surveys completed within 3.2 km (2 mi) of the currently proposed project item. The second section presents a review of previously recorded archeological sites located within 3.2 km (2 mi) of this study area. Finally, a description of previously recorded standing structures located within 3.2 km (2 mi) of the project parcel is presented. The information contained in this review was based on a background search of data currently on file at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Divisions of Archaeology and Historic Preservation, in Baton Rouge.

Previously Conducted Cultural Resources Surveys Located within 3.2 km (2 mi) of the Currently Proposed Project Area

A review of the Louisiana site files identified a total of four previously completed cultural resources surveys and archeological inventories conducted within 3.2 km (2 mi) of the currently proposed project area (Table 1). These investigations resulted in the identification and/or relocation of 178 archeological sites as well as 28 magnetic anomalies. While a total of five previously recorded sites (16JE49, 16JE124, 16JE127, 16JE128, and 16JE129) were located within 3.2 km (2 mi) of the currently proposed project area, none of these were situated within the currently proposed area of potential effect. All four identified surveys were conducted in portions of Jefferson Parish; they are discussed here in chronological order.

Coastal Environments, Inc. of Baton Rouge, Louisiana conducted a Phase I cultural resources survey and archeological inventory during 1977 of the Barataria, Segnette, and Rigaud waterways on behalf of the U.S. Army Corps of Engineers, New Orleans District (Gagliano et al. 1979). The project was undertaken prior to proposed dredging of the waterways and spoil deposition. The survey consisted of bankline examination by boat, pedestrian survey, probing, and auger testing of approximately 70.4 km (44 mi) of bayou water courses. During the course of this survey, 77 prehistoric and historic period archeological sites (16JE1 - 16JE3, 16JE7 - 16JE9, 16JE12 - 16JE18, 16JE34 - 16JE36, 16JE46, 16JE49, 16JE53 - 16JE56, 16JE60, 16JE66, 16JE68, 16JE80, and 16JE82 - 16JE132) were identified. Of these, 27 (16JE1, 16JE2, 16JE12 - 16JE18, 16JE46, 16JE53, 16JE83, 16JE92, 16JE115 -16JE120, 16JE122, 16JE126 - 16JE132) were reported to be outside of the Area of Potential Effect. Of those sites located in the survey area, only Sites 16JE3, 16JE36, 16JE49, 16JE60 and 16JE68 were assessed significant; however, no

Table 1. Previously Completed Cultural Resources Surveys Located Within 3.2 km (2 mi) of the Proposed Project Area

Field Date	Report Number	Title/Author	Investigation Methods	Results and Recommendations
Jefferson Parish				
1977	22-732	*Cultural Resources Survey of the Barataria, Segnette, and Rigaud Waterways, Jefferson Parish, Louisiana* (Gagliano et al. 1979)	Records review, boat survey, pedestrian survey, and soil borings	A total of 77 sites identified during this survey (16JE1 - 16JE3, 16JE7 - 16JE9, 16JE12 - 16JE18, 16JE34 - 16JE36, 16JE46, 16JE49, 16JE53 - 16JE56, 16JE60, 16JE66, 16JE68, 16JE80, and 16JE82 - 16JE132). Of these sites, 19 (16JE7, 16JE35, 16JE54 - 16JE56, 16JE80, 16JE84 -16JE86, 16JE88, 16JE93, 16JE98, 16JE104 - 16JE106, 16JE110 - 16JE112, and 16JE124) were assessed as potentially significant. In addition, Site 16JE49 had previously been listed in the National Register. Additional testing was recommended for 19 of the potentially significant sites. The remaining sites were assessed as not significant and no additional testing was recommended for these sites.
1984	22-912	*Remote Sensing Survey of the Fort Livingston Offshore Borrow Area, Jefferson Parish, Louisiana* (Stout 1984)	Electronic systems survey, including magnetometer, depth sounder, and positioning system	A total of 28 magnetic anomalies were identified within the survey area. These anomalies were not assessed as to their significance; however, no additional testing was recommended.
1984	22-1000	*Preserving the Past for the Future: A Comprehensive Archeological and Historic Sites Inventory of Jefferson Parish, Louisiana* (Goodwin et al. 1985)	Records review, pedestrian survey, shovel testing, and probing	Inventoried 126 previously recorded sites (16JE1 - 16JE24, 16JE34 - 16JE40, 16JE43 - 16JE71, 16JE73 - 16JE138) and identified four sites (no site numbers provided). Of these, Sites 16JE2, 16JE3, 16JE11, 16JE17, 16JE18, 16JE21, 16JE22, 16JE35, 16JE36, 16JE38, 16JE45, 16JE60, 16JE68, 16JE85, 16JE122, 16JE129, 16JE130, and 16JE138 were assessed as potentially significant; however, additional testing was only recommended for Sites 16JE17 and 16JE18.
1995	22-1769	*Cultural Resources Investigations on Grand Terre Island, Jefferson Parish, Louisiana* (Maygarden et al. 1995)	Records review, pedestrian survey, probing, auger testing, shovel testing, magnetometer survey, metal detector survey, and canal wire drag	Previously recorded sites 16JE127, 16JE128, and 16JE129 were relocated. In addition, 10 magnetic anomalies were identified (Anomalies 1 – 10). Sites 16JE128 and 16JE129 as well as Anomalies 7 – 10 were assessed as eligible for nomination to the National Register of Historic Places and avoidance or additional testing was recommended. Site 16JE127 and Anomalies 1 – 6 were assessed as not significant, and no additional testing was recommended.

additional testing of these sites was recommended. In addition, Gagliano et al. (1979) reported that Site 16JE49 (Fort Livingston) had been listed previously in the National Register of Historic Places. A total of 19 of the sites (16JE7, 16JE35, 16JE54 - 16JE56, 16JE80, 16JE84 -16JE86, 16JE88, 16JE93, 16JE98, 16JE104 - 16JE106, 16JE110 - 16JE112, and 16JE124) were assessed as potentially significant. Of these, additional testing was recommended for Sites 16JE80, 16JE85, 16JE86, 16JE93, 16JE98, 16JE104 - 16JE106, 16JE110, 16JE111, and 16JE124, while no additional testing was recommended for the remaining potentially significant sites. The remaining 26 sites identified within the study area were assessed as not significant, and no additional testing was recommended.

Of the 27 sites identified by Gagliano et al. (1979) beyond the Area of Potential Effect, Sites 16JE2, 16JE46, 16JE83, 16JE92, 16JE128, and 16JE129 were assessed as significant while Site 16JE132 was assessed as potentially significant. Sites 16JE53, 16JE115 - 16JE120, 16JE122, 16JE126, 16JE127, 16JE130, and 16JE131 were assessed as not significant. The significance of Sites 16JE1 and 16JE12 - 16JE18 was not assessed. No recommendations for additional testing were reported for any of the sites located beyond the proposed project area. Of the 77 archeological sites identified during survey, a total of five (16JE49, 16JE124, 16JE127, 16JE128, and 16JE129) are located within 3.2 km (2 mi) of the currently proposed project area, and they are discussed below.

The U.S. Army Corps of Engineers, New Orleans District conducted a remote sensing survey during January of 1984 of a proposed 70 ha (173 ac) offshore sand borrow area located southeast of the western tip of Grand Terre Island, Jefferson Parish, Louisiana (Stout 1984). According to Stout (1984), the fill was to be utilized in an attempt to halt erosion at Fort Livingston (Site 16JE49). Magnetometer survey augmented by utilization of a depth sounder resulted in the identification of 28 magnetic anomalies within the proposed project area. These 28 anomalies were not assessed by Stout (1984). In addition, it was noted that three areas measuring approximately 4 ha (10 ac) in size were identified as not containing any of these 28 magnetic anomalies. It was reported that these three areas would be utilized for sand borrowing and thus, no additional testing of the identified anomalies was recommended. Site 16JE49 is situated within 2.3 km (2 mi) of the currently proposed project area and is discussed below.

During 1984, R. Christopher Goodwin & Associates, Inc. compiled a comprehensive archeological and historical sites inventory of Jefferson Parish, Louisiana (Goodwin et al. 1985). Although historic period sites were emphasized, the condition and research potential of previously recorded prehistoric sites also was reviewed. A total of 126 previously recorded sites (16JE1 - 16JE24, 16JE34 - 16JE40, 16JE43 - 16JE71, and 16JE73 - 16JE138) were noted. Of these, 16 sites (16JE2, 16JE3, 16JE11, 16JE21, 16JE22, 16JE35, 16JE36, 16JE38, 16JE45, 16JE60, 16JE68, 16JE85, 16JE122, 16JE129, 16JE130, and 16JE138) were assessed as significant. Sites 16JE17 and 16JE18 were assessed as potentially significant, and additional testing was recommended. In addition, limited field reconnaissance was conducted, and cultural materials were collected from several sites identified in the parish. A total of five sites (16JE49, 16JE124, 16JE127, 16JE128, and 16JE129) reported in Goodwin et al. (1985) are located within 3.2 km (2 mi) of the current project area and are discussed in the section on sites below.

Earth Search, Inc. of New Orleans, Louisiana completed a Phase I cultural resources survey and archeological inventory during April of 1995 of a portion of Grand Terre Island, Jefferson Parish, Louisiana prior to the proposed deposition of dredge spoil on and adjacent to the island (Maygarden et al. 1995). The survey, which was conducted on behalf of the U.S. Army Corps of Engineers, New Orleans District, included an area measuring 1 x 4 km (0.6 x 2.5 mi) in size. Pedestrian survey augmented by shovel testing, auger testing, probing, and remote sensing utilizing a magnetometer and a metal detector resulted in the relocation of previously

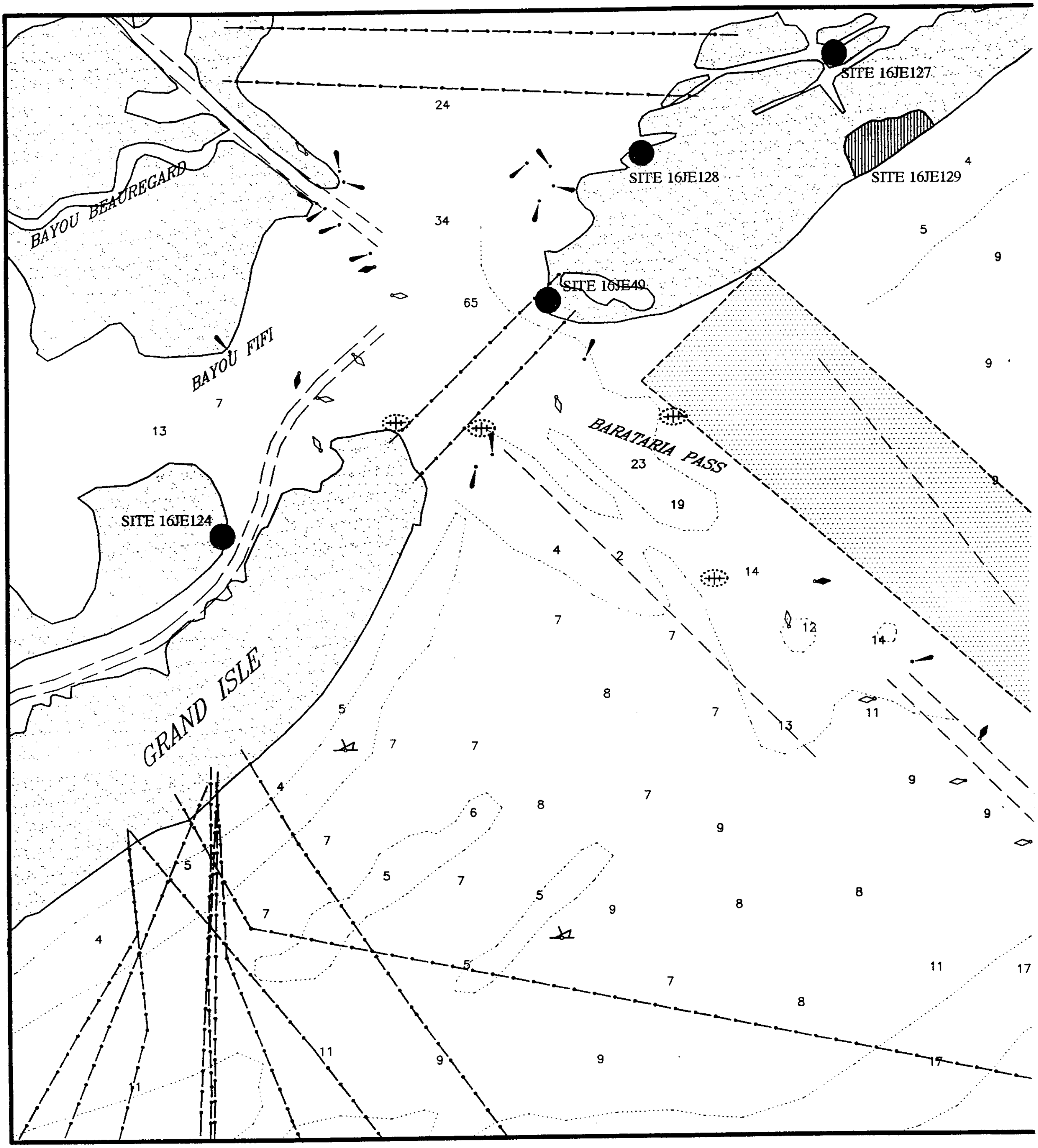
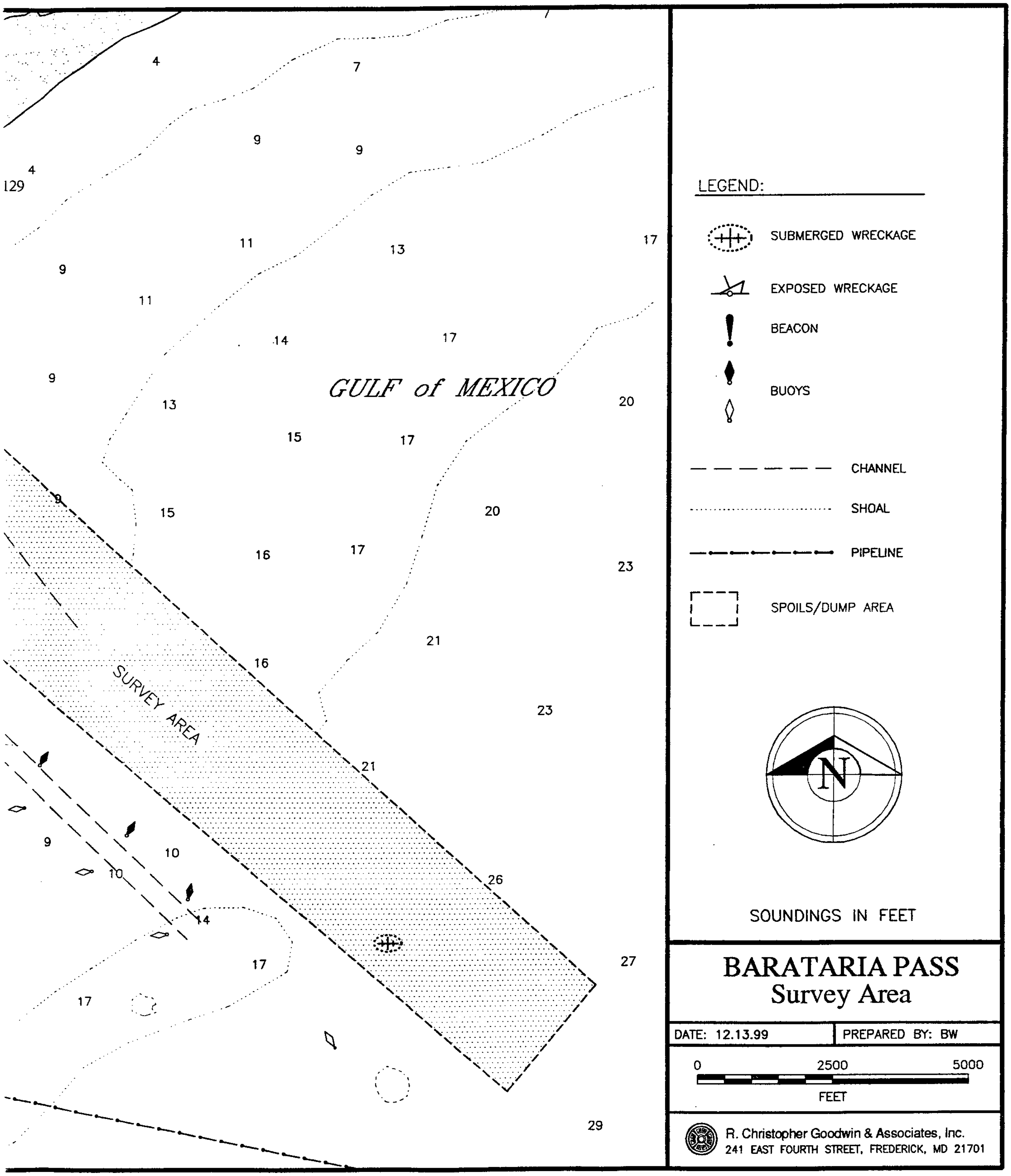


Figure 13. Map of the Survey Area in Barataria Pass with Approximate Locations of Previously Identified Sites

(1)



GULF of MEXICO
SURVEY AREA
LEGEND:
SUBMERGED WRECKAGE
EXPOSED WRECKAGE
BEACON
BUOYS
CHANNEL
SHOAL
PIPELINE
SPOILS/DUMP AREA
N
SOUNDINGS IN FEET
BARATARIA PASS
Survey Area
DATE: 12.13.99
PREPARED BY: BW
0
2500
5000
FEET
R. Christopher Goodwin & Associates, Inc.
241 EAST FOURTH STREET, FREDERICK, MD 21701

(2)

Table 2. Previously Recorded Archeological Sites Located within 3.2 km (2 mi) of the Currently Proposed Project Area

Site No.	USGS 7.5' Quadrangle	Site Description	Cultural Affiliation	Field Methodology	NRHP Eligibility	Recorded By
Jefferson Parish						
16JE49	Barataria Pass, La.	Historic Fort Livingston	Early – late nineteenth century historic period	Pedestrian survey	Listed on the National Register during August 1974	Weinstein 1977; R. Christopher Goodwin & Associates, Inc. 1984
16JE124	Barataria Pass, La.	Prehistoric and historic period artifact scatter	Undetermined prehistoric and historic periods	Pedestrian survey and probing	Potentially significant	Weinstein 1977; R. Christopher Goodwin & Associates, Inc. 1984
16JE127	Barataria Pass, La.	Historic period artifact scatter	Nineteenth century historic period	Pedestrian survey, shovel testing, auger testing, probing, and remote sensing survey	Not significant	Weinstein 1977; R. Christopher Goodwin & Associates, Inc. 1984; Santeford 1995
16JE128	Barataria Pass, La.	Historic period artifact scatter	Early nineteenth century historic period	Pedestrian survey, shovel testing, probing, and magnetometer survey	Eligible	Weinstein 1977; R. Christopher Goodwin & Associates, Inc. 1984; Santeford 1995
16JE129	Barataria Pass, La.	Historic period artifact scatter and sugar house ruins	Nineteenth century historic period	Pedestrian survey, shovel testing, auger testing, probing, and metal detector survey	Eligible	Weinstein 1977; R. Christopher Goodwin & Associates, Inc. 1984; Santeford 1995

concerning additional testing were provided on the site record form.

An attempt to relocate Site 16JE124 was made during 1984 by R. Christopher Goodwin & Associates, Inc. (Goodwin et al. 1985). According to information presented on the State of Louisiana Site Record Update Form, a pedestrian survey augmented by probing of the reported location of Site 16JE124 failed to identify any cultural resources. It was suggested that the site had been destroyed by erosion since it was recorded in 1977. Site 16JE124 was not specifically assessed, and no recommendations concerning additional testing of the site were noted on the site record form.

Site 16JE127 was identified within Section 21 of Township 21S, Range 25E, by Weinstein during 1977 (Gagliano et al. 1979). The site reportedly, measuring 46 x 91 m (150.9 x 298.6 ft), was described as a scatter of oyster shell and brick noted during pedestrian survey. It was suggested that the site possibly represented the former location of residential structures; however, no possible date of occupation was reported. Site 16JE127 was assessed as not significant, and no additional testing of the site was recommended.

Site 16JE127 was reinvestigated by R. Christopher Goodwin & Associates, Inc. during 1984 (Goodwin et al. 1985). According to data provided on the State of Louisiana Site Record Update Form, pedestrian survey of the area resulted in the identification of a concentration of bricks and oyster shell; however, none of these materials were collected. It was suggested that Site

16JE127 had been destroyed by ongoing dredging activities and erosion. No statements regarding the significance of the site were reported; however, no additional testing of Site 16JE127 was recommended.

Subsequently, Site 16JE127 was relocated during a 1995 Phase I cultural resources survey and archeological inventory of Grand Terre Island, which was completed by Earth Search, Inc. (Maygarden et al. 1995). According to information presented on the State of Louisiana Site Update Form completed by Lawrence Santeford in June of 1995, pedestrian survey augmented by shovel testing, auger testing, probing, and a metal detector survey resulted in the collection of historic period ceramic sherds, glass shards, metal, and faunal materials. It was suggested that Site 16JE127 represented a nineteenth century historic period occupation. Site 16JE127 was assessed as not significant, and no additional testing of the site was recommended.

Site 16JE128, situated within Section 21 of Township 21S, Range 25E, originally was recorded in 1977 by Richard Weinstein (Gagliano et al. 1979). The site was described as a 70 m (229.7 ft) long oyster midden situated along the shoreline. In addition, a scatter of historic period artifacts was noted offshore. Pedestrian survey resulted in the collection of historic period ceramic sherds, glass bottles, ceramic pipe fragments, and gunflints. It was suggested that Site 16JE128 possibly represented the location of a settlement occupied by Jean and Alexandre Frederic Lafitte on Grand Terre Island between 1806 and 1814. Site 16JE128 was assessed as potentially significant, and additional testing of the site was recommended.

R. Christopher Goodwin & Associates, Inc. re-examined Site 16JE128 during 1984 as part of a Phase I survey of previously recorded archeological sites situated within Jefferson Parish, Louisiana (Goodwin et al. 1985). According to data presented on the State of Louisiana Site Record Update Form, pedestrian survey augmented by probing of the site area resulted in the identification of a 40 m (131.2 ft) long *Rangia* shell lens; however, no historic period artifacts were noted. It was suggested that Site 16JE128 had been destroyed by pipeline canal construction activities.

Subsequently, Earth Search, Inc. reinvestigated Site 16JE128 during 1995 as part of a cultural resources survey of Grand Terre Island (Maygarden et al. 1995). According to information presented on the State of Louisiana Site Update Form completed by Lawrence Santeford, Site 16JE128 measured approximately 70 x 140 m (229.7 x 459.3 ft) in size. Pedestrian survey augmented by shovel testing, auger testing, probing, and magnetometer survey of the site area resulted in the identification of a historic period artifact scatter that included historic period ceramic sherds, bottle glass, kaolin pipestem fragments, brick, metal fragments, gunflints, and faunal materials. In addition, wooden posts, boards, and an unidentified box-type feature constructed of wood were noted protruding from Barataria Bay. According to Maygarden et al. (1995), no cultural materials were collected from Site 16JE128. It was suggested that Site 16JE128 represented an early nineteenth century settlement, possibly associated with Jean Laffite. Maygarden et al. (1995) assessed Site 16JE128 as eligible for nomination to the National Register applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). It was recommended the site be avoided; however, if avoidance was not possible, additional testing of Site 16JE128 was recommended.

The final previously recorded archeological site (16JE129) identified within 3.2 km (2 mi) of the current project area originally was recorded by Richard Weinstein during 1977 (Gagliano et al. 1979). The site, situated within Section 22 of Township 21S, Range 25E, was described as a historic period artifact scatter associated with the ruins of a sugar house. While a pedestrian survey of the site area was conducted, no cultural materials were collected. It was suggested that the sugar house remains identified at Site 16JE129 were associated with Forstall Plantation, which was

in operation from ca. 1823 – 1888. Site 16JE129 was assessed as potentially significant, and additional testing was recommended.

Subsequently, Site 16JE129 was relocated by R. Christopher Goodwin & Associates, Inc. in 1984 (Goodwin et al. 1985). According to data presented on the State of Louisiana Site Record Update Form, pedestrian survey and probing of the site area was conducted; however, no cultural materials were collected. It also was noted that no recent disturbance to the site had taken place since its recordation in 1977. Site 16JE129 was assessed as potentially significant and Goodwin, et al. concurred with Weinsteins' recommendation of additional testing.

Earth Search, Inc. completed additional testing of Site 16JE129 in 1995 during survey of Grand Terre Island (Maygarden et al. 1995). It was noted that the site measured 213.4 x 457.2 m (700 x 1,500 ft) in size. Pedestrian survey augmented by shovel testing, auger testing, probing, and metal detector survey resulted in the collection of historic period ceramics, bottle glass, brick, mortar, metal fragments, and faunal material. In addition, the previously mentioned sugar house remains were noted as well as wooden post and plank alignments. Maygarden et al. (1995) assessed Site 16JE129 as eligible for nomination to the National Register applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). It was recommended the site be avoided; however, if avoidance was not possible, additional testing of Site 16JE129 was recommended.

Previously Recorded Standing Structures Located within 3.2 km (2 mi) of the Currently Proposed Project Area

A review of the standing structure files located at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Historic Preservation, Baton Rouge, failed to identify any previously recorded standing structures located within 3.2 km (2 mi) of the currently proposed project area.

CHAPTER VI

RESULTS OF ARCHIVAL RESEARCH

Terrestrial Cultural Locations in the Vicinity of Barataria Pass

Barataria Pass is located between Grand Isle and Grand Terre Island. Of the two islands, Grand Terre is the more historically significant. This eastern island contains three historically noteworthy sites, which also are representative of important periods of history in Jefferson Parish. Grand Isle lies at the southerly terminus of the Barataria Bay waterway. It is low and sandy in character, and about 7.5 miles long and 1 mile wide at its center. The inhabitants are engaged principally in fishing and the processing of seafood, exploration for oil and its production, and commercial activities serving tourists. Thousands of tourists visit Grand Isle yearly for its surf bathing and deep-sea fishing.

During the early part of this century, a large number of stern-wheel gasoline boats sailed the New Orleans-Grand Isle trade. Among them were the *Hazel*, the *Nevada,* and *the J.S. & B,* which carried freight and passengers; and the *Tulane*, which also carried U.S. mail. There also were a large number of private boats that carried passengers during the Summer months to bathing areas on Grand Isle. Ten fishing settlements existed along the route. Trade boats sailed between these villages from New Orleans to Grand Isle, carrying products for market and bring food supplies for the people living there (U.S. Congress 1917:doc. no. 200). The greatest difficulties to navigation around Grand Isle was the extreme shallow depth of the water, especially in the Winter season. The water at Bayou Rigault was at times so shallow that a landing skiff had to be employed (U.S. Congress 1917:doc. no. 200).

Grand Terre's early history is closely associated with Jean Lafitte, who had his headquarters just north of where Fort Livingston (Site 16JE49) is situated (Figures 14 and 15). Although not a military site, Fort Lafitte (16JE128) served a defensive function for Jean Lafitte and his corsairs. The privateers established their base of operations on the northwest flank of Grand Terre, facing Barataria Bay, prior to 1805. Shortly before the Battle of New Orleans, Governor Claiborne had the Federal fleet attack the fort; he thought erroneously that the Baratarians would assist the British invasion. Lafitte was warned of the raid, and he ordered his men to abandon the island. The contraband in the storehouse was confiscated, and the structures were burned. Later, this site was part of the parcel purchased by the U.S. Government for the erection of Fort Livingston. The ruins of Fort Lafitte stood as a landmark into the twentieth century. It occasionally was plotted on nineteenth century maps (Kane 1943:51-54; Jackson 1914; Swanson 1975:151-152).

Subsequently, Fort Lafitte, also known as Lafitte's Settlement, was completely destroyed by subsidence and erosion. In 1977, this site was described as a wave-washed oyster and *Rangia* shell midden. Today, no cultural material is visible on or off shore. Fort Livingston is listed on the National Register, but it has been seriously damaged by erosion (Goodwin and Yakubik 1985:182).

The vascular riverine setting of Jefferson Parish, and its proximity to the City of New Orleans, made the parish strategically important during the eighteenth and nineteenth centuries. The Barataria area

provided access to New Orleans through a system of streams, bayous, and lakes that reached to the Mississippi River. Parish lands above New Orleans along the Mississippi River also provided the logical location for defensive lines protecting New Orleans. Despite these factors, construction of historic fortifications in the parish never was extensive. Nevertheless, several forts were constructed and occupied in the parish during the late eighteenth and nineteenth centuries.

It was not until the War of 1812, however, that the United States government began an active campaign to establish forts along the coast. Despite its strategic location, Jefferson Parish saw no major military action during the War of 1812. With the approach of the British to New Orleans in late 1814, fortifications were built and secured above and below the city.

Following the War of 1812, the United States Government initiated a defensive plan that sought to protect the nation from foreign invasion. This plan proposed the construction of several forts along the Gulf coast, including Fort Livingston on Grand Terre Island on the Barataria Pass. Although plans for a battery on the western tip of Grand Terre were formulated as early as 1813, the land was not acquired by the government until 1834; it had been intermittently occupied for military purposes as early as 1814 (Hansen 1941:413; Roberts 1988:342). Originally, the fort was known as Fort at Barataria, or Fort on Grande Terre Island; after 1833, it was named for Edward Livingston, Secretary of State under President Andrew Jackson (Roberts 1988:342), who also had been one of Lafitte's attorneys, who interceded for Lafitte in his many clashes with United States authorities.

Fort Livingston faces Barataria Pass and is one of the largest coastal forts in Louisiana and the only fort on the Gulf of Mexico. Original plans for the fort were drawn up by engineer Bartholemy Lafon. Four years later, General Simon Bernard, head of the Board of Fortifications, selected the specific site on Grande Terre Island. In 1822, monies were appropriated by the government for the collection of materials, but no further action was taken at that time. Twelve years later, in 1834, the island was sold to the State of Louisiana by its owners, Étienne de Gruy and his wife. Later that year, the state of Louisiana ceded the island to the federal government (Roberts 1988:342).

The building of Fort Livingston was delayed until 1841. The construction of the fort was directed by Captain J.G. Barnard and by Lt. P.G.T. Beauregard, using new plans drawn by Col. Joseph G. Totten. Specifications for the fort included a four-sided trapezoidal brick rampart enclosing living quarters, guard rooms, a powder magazine, and artillery embayments. A blacksmith's shop, a stable, and a lime house were built, as were officers' quarters (Figure 14 and 15). By 1843, the rampart perimeter of Fort Livingston was in place; however, the fort never was completed. The threat of an eroding shoreline at the construction site, along with delays in funding and difficulties in obtaining necessary building materials, were the primary factors that precluded completion of Fort Livingston. Nevertheless, the site continued in use (Goodwin and Yakubik 1985:178).

The buildings of Fort Livingston were constructed from tabby, a mixture of cement and clam shells. The use of tabby occurred in Gulf areas where large deposits of shells were encountered. In the case of Fort Livingston, a local plantation owner was hired to collect clam shells from coastal areas of Louisiana, which he took from Indian mounds and middens. Consequently, the walls of Fort Livingston still show Indian pottery imbedded in them (Guillet 1982:89).

The building of Fort Livingston never attained high priority status from the US Government. Quarters for the engineer and superintendent were constructed, but operations at Grand Terre were suspended by a department order of July 11, 1834, "in consequence of the want of an officer of engineers (who could be detailed) to take immediate direction of the operations." By 1839, $22,360.85 had been spent on the fort's construction, with about $53,000 remaining unspent on the project with some of the funds

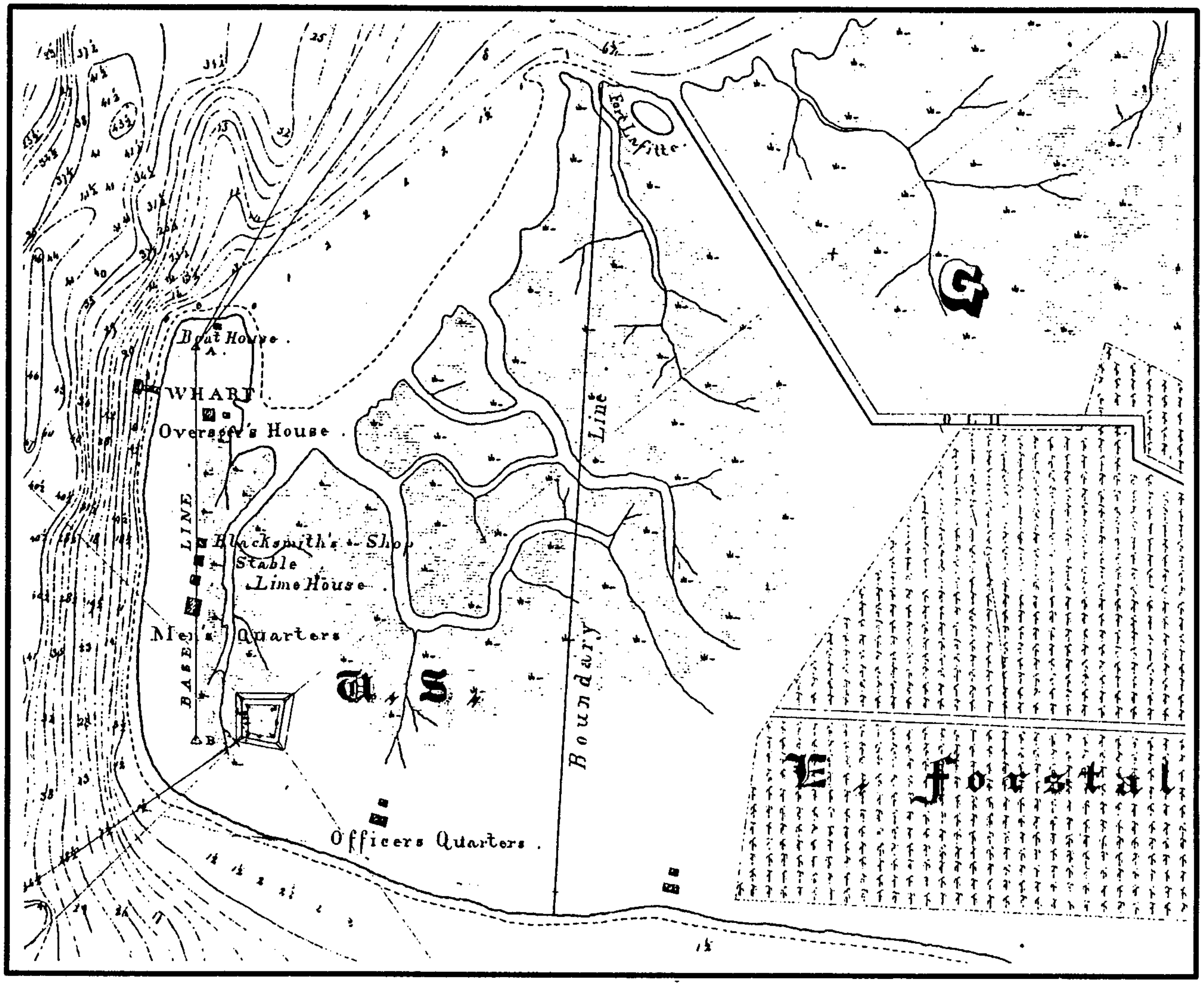


Figure 14. Excerpt from 1841 *Map of Grand Terre Island, La.*, by Captain J.G. Barnard, showing the location of Fort Lafitte, E. Forstall's plantation lands and canals, and Fort Livingston and associated structures: light house, railroad, wharf, boat house, overseer's house, blacksmith shop, stable, lime house, men's quarters, and officers' quarters

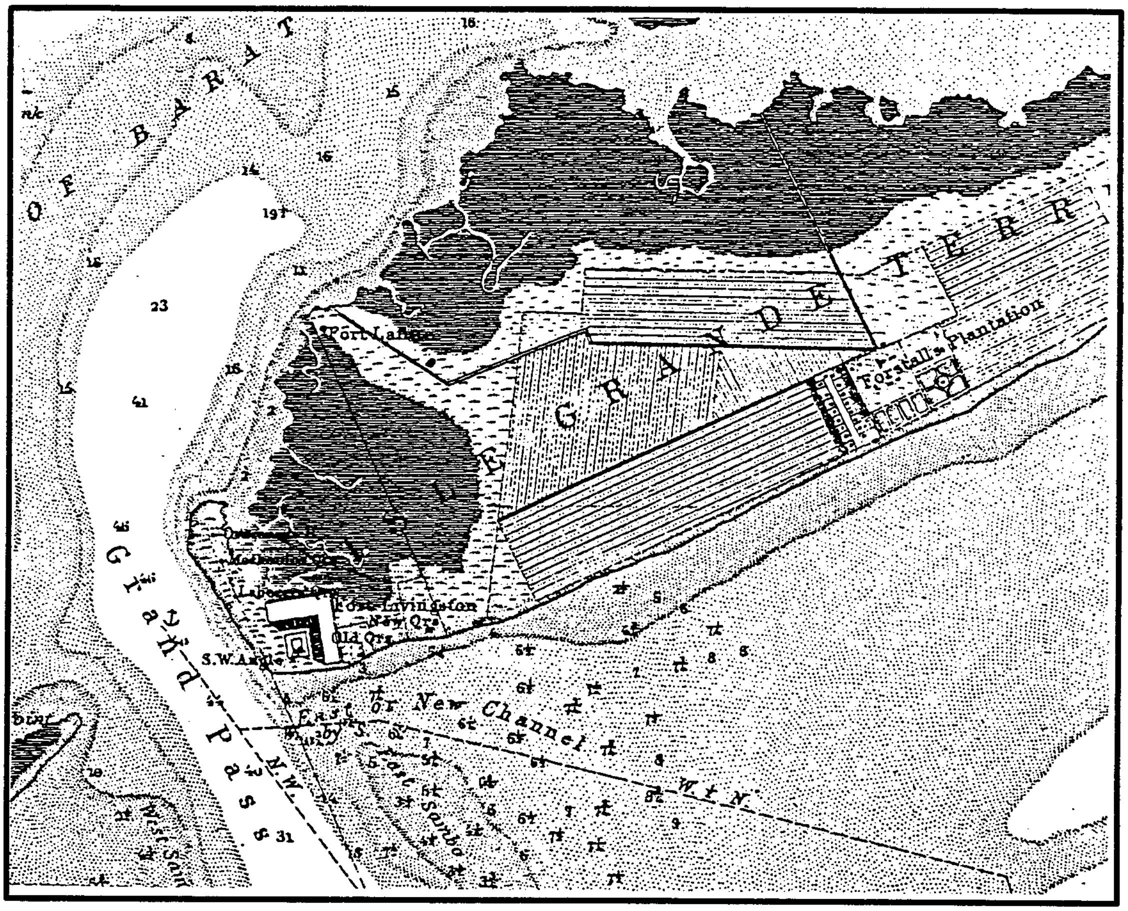


Figure 15. Excerpt from U.S. Coast Survey 1853 *Entrance to Barataria Bay Louisiana* map by F.H. Gerdes, showing Grand Pass (later Barataria Pass), early natural channel courses in the Gulf, and structures on Isle Grande Terre associated with Fort Lafitte, Fort Livingston, and Forstall's Plantation

reverting to surplus (US Congress 1839:doc. no. 67). On January 10, 1843, the Senate had inquired why operations had not been resumed at Fort Livingston. Colonel Totten, Chief Army Engineer, replied to the Secretary of War that a large portion of previous appropriations were expended on supplies that had to be collected, stored, then shipped to the post of Fort Livingston, which was far from all sources of supply. Furthermore, on the 7th of February, 1842, the Committee of Ways and Means appropriated only $10,000 of the requested $90,000 budget. "Owing to the condition of the fort, moreover, this small sum would not bring it into a state to be availed of for any military purpose" (US Congress 1843: doc. no. 79). Finally, construction was stopped in 1861. In the interim, although the fortification had not been regularly garrisoned, it had been kept in a state of repair (Roberts 1988:342). By the start of the Civil War, the incomplete Fort Livingston was seized, as was the U.S. Marine Hospital at McDonoghville, by Louisiana militia forces and then evacuated on April 27, 1862. Federal forces reoccupied it ten months later on February 26, 1863. Following the Civil War, Fort Livingston never again was garrisoned. It was turned over to the Quartermaster Department, which was put in charge of the 55-foot-high, octagonal brick lighthouse that was built on the island in 1856. In 1872, all the fort's guns were dismounted. A hurricane in 1893 partly destroyed the fort's works, but they were not rebuilt. Finally, in 1923, the property was given by the United States Government to the State of Louisiana (Guillet 1982:89), which retained the military reservation (Roberts 1988:342).

Forstall Plantation (Site 16JE129). The land that became known as Forstall Plantation is located on Grande Terre Island, adjacent to federal land on which Fort Livingston was erected (Figures 14 and 15). Grand Terre originally was granted to Joseph Andoeza in 1794. Francois Mayronne purchased the island one year later; he subsequently sold it to Jean Baptiste Moussier in two stages. Moussier obtained half the island in 1821; he acquired the other half in 1823. Moussier established and operated a sugar plantation on the island. In 1829, Moussier mortgaged his plantation and slaves to the Consolidated Association of Planters of Louisiana (F. de Armas, February 19, 1829, NONA), a land bank formed by planters during the 1820s. The bank was designed to provide liquid capital to the sugar industry. An English firm provided a two million dollar loan, which was secured through subscriptions, or shares, which were purchased by the planters. Subscriptions were restricted to planters, who mortgaged their plantations in amounts that equaled the value of their subscriptions. This enabled the planters to secure cash loans for up to one-half the value of their subscriptions. A guarantee of State bonds in 1828 gave additional security to the original loan (Reeves 1980:94). After Moussier's death in 1831, a public sale of the estate was held. All of his property, excluding 1,200 superficial yards located on the western point of the island near the pass, which was retained by his widow, was adjudicated to the Consolidated Association of Planters (F. de Armas, December 19, 1831, NONA).

On November 12, 1832, the Consolidated Association of Planters sold the sugar plantation on Grand Terre Island to Etienne DeGruy. In that year, the property included a house and furniture, fifty-one slaves, a steam engine, agricultural implements, two flat boats, a pirogue, horned cattle, horses, and mules (F. de Armas, November 12, 1832, NONA). Two years later, in September, 1834, DeGruy sold the sugar plantation back to the Consolidated Association of Planters (COB 4, Folio 53, Jefferson Parish). The Association immediately sold the plantation to five men: Alexander Gordon, Edmond Jean Forstall, Placido Forstall, Felix Jean Forstall, and Louis Edouard Forstall. Gordon received two-sixths interest in the land, while the Forstalls each acquired one-sixth interests. The act of sale described the property as a sugar plantation with a brick sugar house that contained a steam engine. The sale also included the house and furniture, forty slaves,

nine horses, thirteen mules, ten pair of oxen, eight heads of horned cattle, agricultural instruments, two flat boats, and a pirogue (COB 4, Folio 230, Jefferson Parish). The partners continued to cultivate sugar cane on the property until the War Between the States. In 1870, a mortgage held on the property by the Consolidated Association of Planters was foreclosed, and the Association acquired the plantation by virtue of a sheriff's sale held on December 14, 1870.

By 1879 the Consolidated Association of the Planters of Louisiana was in liquidation. In December, 1878, the Grande Terre property was sold to Joseph Llulla, who retired to the island (H. Durcalet, April 5, 1879, NONA). After Llulla's death in 1888, the land once again was purchased by the Planters' Association; however, it was not cultivated (Goodwin & Yakubik 1985:118).

Little surface evidence remains today of Forstall plantation. A mound near a corral is all that has survived of the sugar house chimney. No cultural remains other than brick were observed during a survey by Goodwin and Associates in 1985 (Goodwin and Yakubik 1985:118). Earth Search, Inc. identified and documented the functional portions of the sugar house as well as post and plank alignments, during investigations in 1995. The site was considered eligible for listing in the National Register of Historic Places (Maygarden et al. 1995).

Settlement Patterns and Economic Development

Shipping Routes Within the Vicinity of Barataria Bay. The early maritime commerce of Jefferson Parish and the rest of the Barataria Bay basin was based on the consumption of the region's natural resources, and on the growth of a tradition of smuggling to avoid restrictions placed on goods by local authorities. The goods of the Barataria area were shipped in vessels that suited the type of merchandise transported and the requirements of navigation across and throughout the Barataria Bay basin.

Spanish authority was not greatly honored by the region's inhabitants. To circumvent it, local inhabitants developed a broad based network of maritime trade as early as 1794. Goods and slaves were smuggled along two canals above New Orleans, thus avoiding Spanish tariffs; the canals connected the Mississippi to bayou waterways and then to the Gulf of Mexico. Even after the Pinckney Treaty of 1795, which allowed Americans free navigation along the Mississippi River, the local inhabitants continued their smuggling activities throughout Barataria offering their goods to American, French, and English markets.

Even after the purchase of the Louisiana Territory by America in 1803, smuggling continued to grow. Barataria continued as an avenue of illegal trade, for example, with the importation of African slaves, which was encouraged by a government ban on such activity. The local prosperity based on illegal trade attracted privateers, or pirates, such as Jean Lafitte, who stored goods to be smuggled at warehouses throughout the Barataria. During the same time, sugar plantations also were being established on both sides of Barataria Pass--on Grand Isle and Grand Terre Island.

The closing down of Lafitte's base by United States forces in 1814, as well as the prosperity of the Antebellum period, were responsible for a greater shift toward legitimate trade in Barataria. Barataria's regional commercial operations, based on the original extractive industries, shipped locally manufactured goods to markets throughout the region, especially to New Orleans. They included fish, shellfish, timber products for building materials, fuel, and naval stores, and the creation of sawmills and brick works.

Barataria, along with the Gulf Coast, was barricaded during the Civil War. This once again revived smuggling throughout the Barataria waterways. After the war, and prior to the construction of jetties on the Mississippi Delta, various bayous were increasingly used as shipping routes between Barataria Bay and New Orleans. Industrialization increased dramatically, especially with the coming of the railroad.

Manufacturing and storage facilities were required in greater numbers, as were vessels to ship the merchandise. Local industries continued to follow traditional extractive patterns, with an increase in processing plants close to the area of extraction, such as fish and shrimp factories, wood mills, and a new commodity, petroleum. Each product required special vessels for its transportation.

Shipping Routes Outside of Barataria Bay. Shipping routes developed in the Gulf in relation to the goods that were sought and produced and the markets they were taken to. Figures 16 - 19 show the progression of shipping routes within the Gulf from 1763 to the present day. From 1763 to 1821, shipping routes were dominated by the Spanish, French, and British trade routes. Important centers of export were in Mexico, the Mississippi Sound area (from the Mississippi River to Pensacola), and Cuba. By 1862, other ports opened up between Mexico and the Mississippi River. Florida ports developed as far south as Tampa, and contributed goods and ships which plied the waters south to the West Indies and Latin America, east around the Florida Keys, and then north either to the East Coast or Europe. A more detailed look at sea routes within the Gulf, and the interaction among Gulf ports is shown in Figure 18. As trade and industry grew, and as ship technology changed to take on an increased load capacity, routes to the outside of the Gulf continued south between Yucatan and Cuba, or through the Bahama Straits towards America's east coast or on to Europe (Figures 19 and 20).

No exact information is available for shipwrecks during the 1500s, 1600s, and 1700s for the Gulf of Mexico. The compiling of shipwreck data including dates and positions began in the early 1800s.

Generally, shipwreck losses in the Gulf occurred because of politics, weather, and trade. They show the following historic trends from 1500 to 1999 (Garrison et al. 1989):

1500-1549: losses are random and reflect Spanish activities associated with exploration of the Gulf coast and exploitation of Gulf coast interior resources;

1550-1599: losses become patterned and are associated with flota routes and weather factors, especially along the Texas and Florida coasts;

1600-1649: losses remain Spanish vessels, in particular losses due to the 1622 hurricane;

1650-1699: losses mostly to Spanish ships, but the first French ships are lost at the Gulf of Matagorda Bay in 1685;

1700-1749: the first major change in ship loss patterns occur during this period and reflect French colonization of Louisiana and Spanish movements into Pensacola to counter the French;

1750-1799: ship losses reflect the apex of Spanish and French colonization and commercial movements in the northern Gulf;

1800-1849: shipwreck losses still remain associated with colonization and its extension in the Gulf area; port development occurs west of the Mississippi delta in Louisiana and Texas and shipwreck patterns show a westward movement;

1850-1899: a westward movement of shipwrecks continues but is offset by the development of ports east of the Mississippi delta as principal ports evolve there in New Orleans, Mobile, and the North-central Gulf; the area becomes a major egress channel for inter-Gulf commerce;

1900-1919: the inter-Gulf pattern of shipping and commerce is

magnified by intra-Gulf trade, the development of fisheries off of Florida, the growing port of Tampa, and the rise of the Mississippi River and New Orleans as major nodes for commercial sea routes;

1919-1939: a fully modern era of shipping develops reflecting commerce in commodity goods, such as oil and agriculture;

1940-1959: Florida fisheries and trade through the port of Tampa are two important factors contributing to shipwrecks in the eastern Gulf; petroleum production causes intra-Gulf shipping routes to shift towards Houston;

1960-1999: all shipping routes, for both inter- and intra-Gulf trade, remain east-west reflecting bulk cargo movement from central and north-west ports on the Gulf of Mexico; losses are associated with exploration and production of petroleum in the north-west area of the outer shelf.

<u>Barataria Bay Waterway and Barataria Pass</u>. The current Barataria Bay Waterway is the main shipping route across Barataria Bay. It crosses Barataria Pass and extends into the Gulf of Mexico. The portion of the Waterway that extends into the Gulf is parallel to the ODMDS that comprises the project area. A natural opening, the Pass was employed at least as early as 1817 when ships sailed through the deepest part as measured by soundings (see Figure 21 for the earliest view of the Pass, and Figure 15, which names the route as "East or New Channel").

The creation of the Barataria Bay Waterway was the result of the Rivers and Harbors Act of March 2, 1919, which called for a channel 5 ft deep and 50 ft wide from Bayou Villars to Grand Isle. The dredging project was completed in 1925. Total length of the improvement was 37 miles. On July 3, 1958, the Rivers and Harbors Act provided for the 37 mi long channel to be increased in depth to 12 ft, and in width to 125 ft. It followed the route of the previous project up to Bayou St. Denis. But from there the channel was relocated along the western shore of Barataria Bay and through Barataria Pass to the 12 ft depth contour in the Gulf of Mexico; a 4.3 mi arm of the channel was added as a westerly extension along Bayou Rigaud. The land areas surrounding the Barataria Bay are mainly dependent on maritime transportation of goods principally by means of barge tows and fishing vessels. The purpose of the channel was to provide a suitable navigable route for vessels engaged primarily in the movement of crude oil, supplies, and equipment for the drilling of offshore and inshore oil wells; for the shrimping and oyster fisheries of the area; and for pleasure fishing and yachting vessels (U.S. Congress House Document 1956, vol. 31:3,22). On November 31, 1967, work was begun to widen the bar entrance channel to Barataria Bay Waterway from 125 feet to 250 feet. The work was completed on December 29, 1967. The cost of the dredging projects was $1,647,722 (U.S. Corps of Engineers internet site 1999).

The impetus for the waterway came in large part from the region's oil concerns, which had dredged numerous canals and channels of their own to well locations in the area (see Figure 22 for oil and gas field locations in the Barataria Bay Waterway region). In January 1947, the Humble Oil & Refining Co. dredged a channel 7,200 feet long, 12 feet deep, and 200 feet wide across the offshore bar at Barataria Pass into the Gulf of Mexico along with two other channels to their Bayou Rigaud facilities, a distance of 1.6 miles (US Congress 1917:doc. no. 200; 1956:vol. 31:9)(See Figure 23 for an illustration of the old and new routes of the Barataria Bay Waterway, as well as Humble Oil installations on the Gulf side of Grand Isle). Dredging and shoreline construction within the Barataria Bay Waterway region is summarized in Table 3. Besides channel dredging, shoal build-up dredging, beach erosion control, and the building of wharfs are

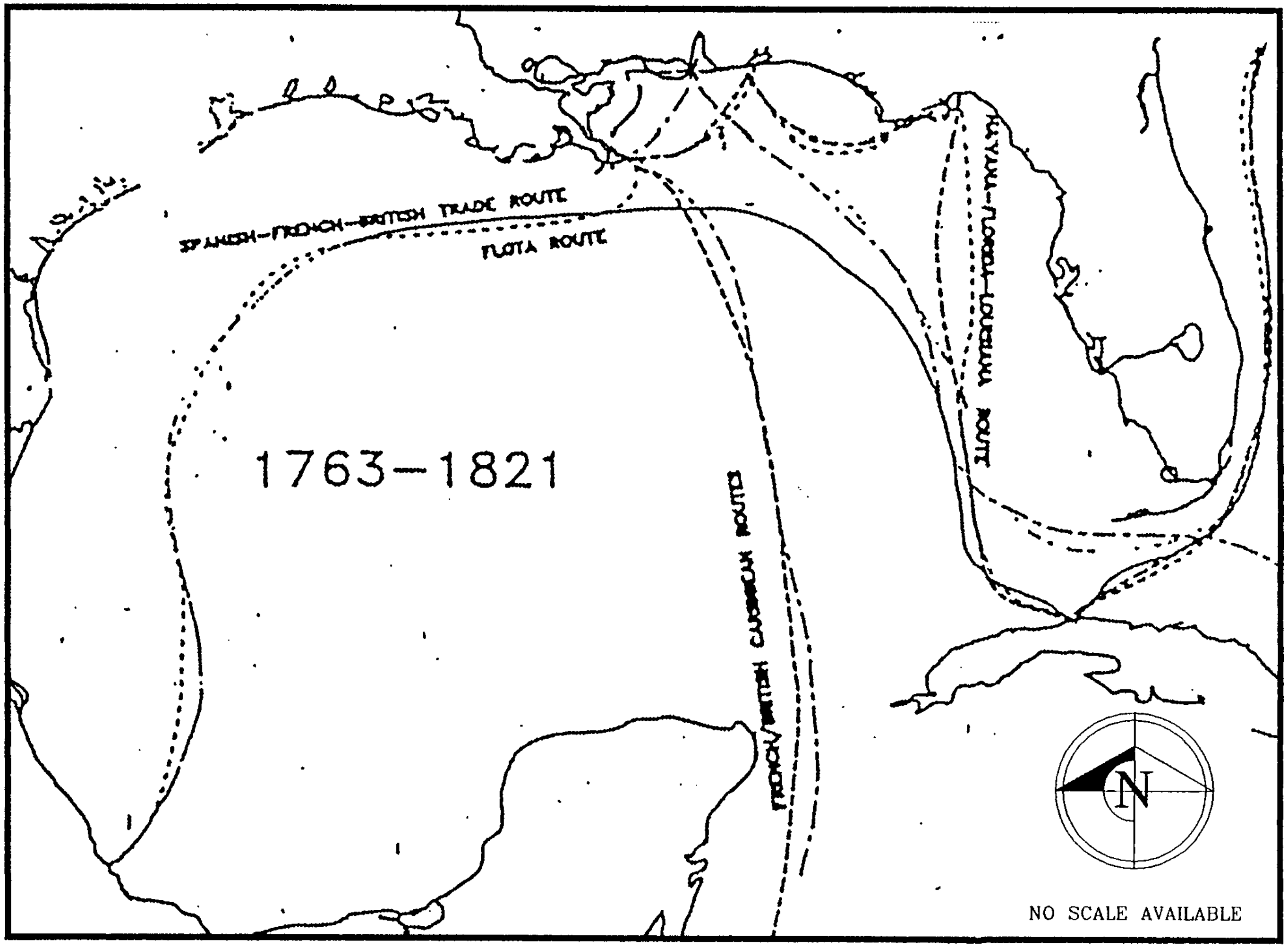


Figure 16. Map of shipping routes within the Gulf of Mexico and points outside, 1763-1821. From Garrison *et al.* 1989

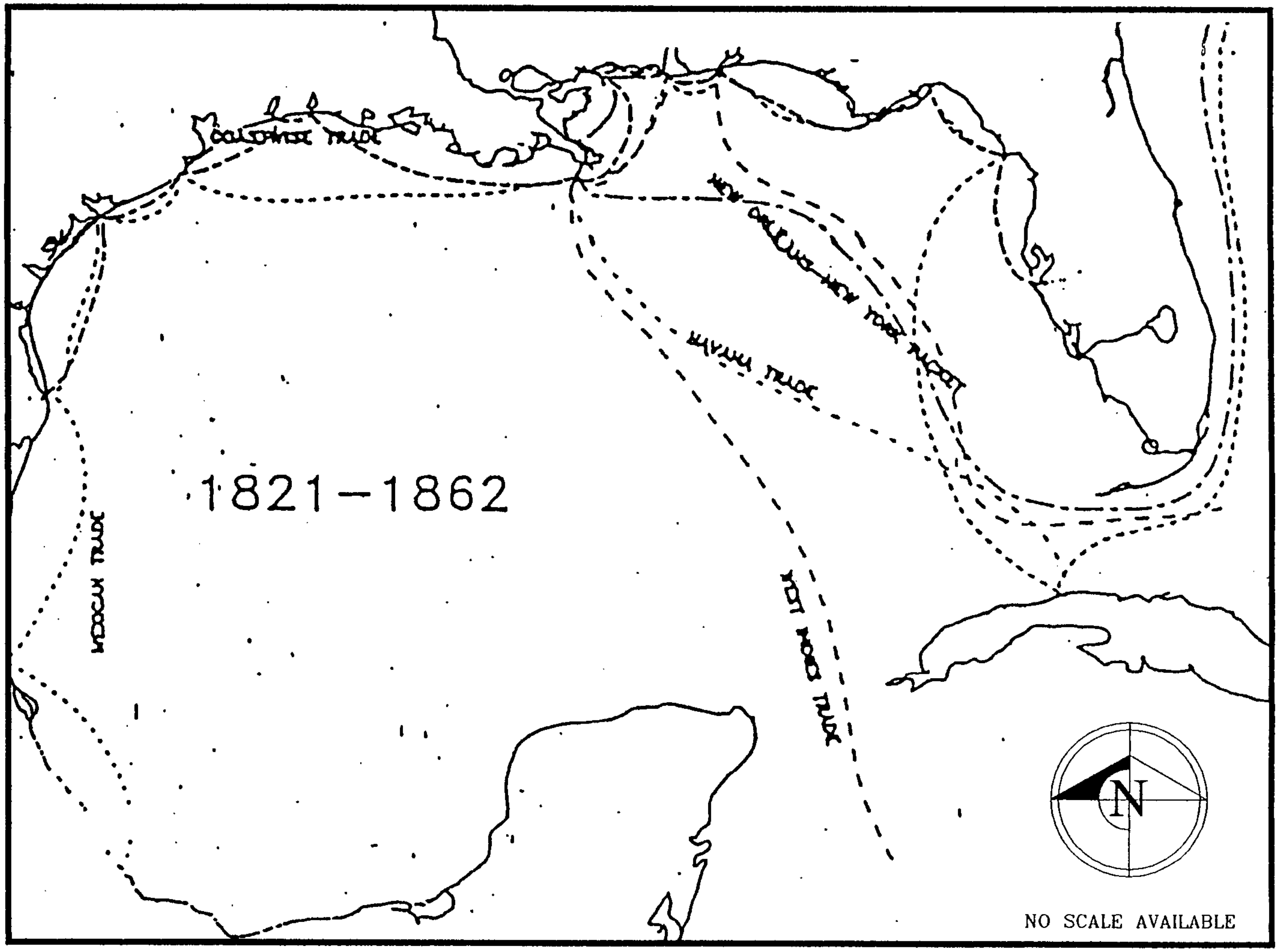


Figure 17. Map of shipping routes within the Gulf of Mexico and points outside, 1821-1862. From Garrison *et al.* 1989

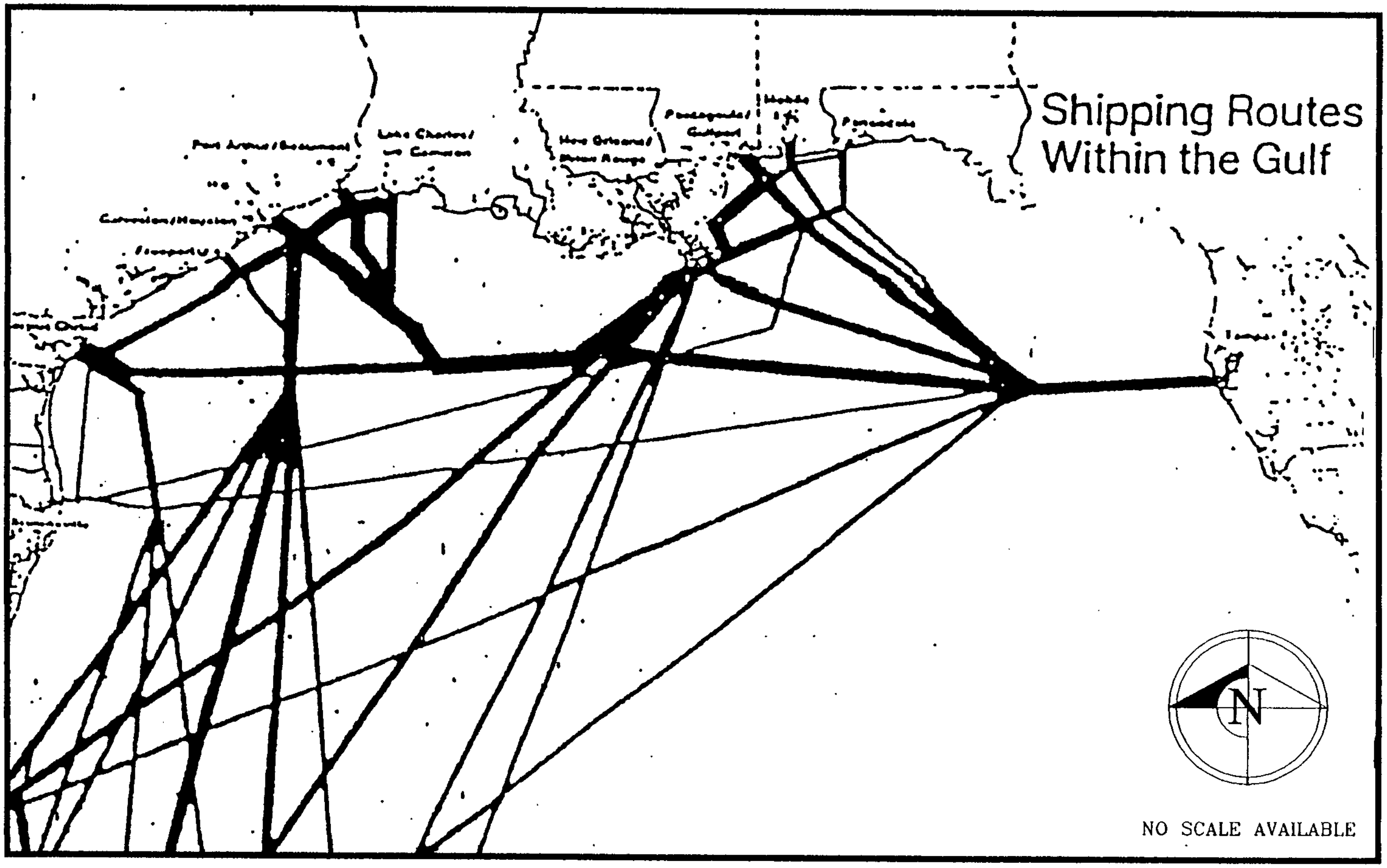


Figure 18. Map of present day shipping routes within the Gulf of Mexico. From Garrison *et al.* 1989

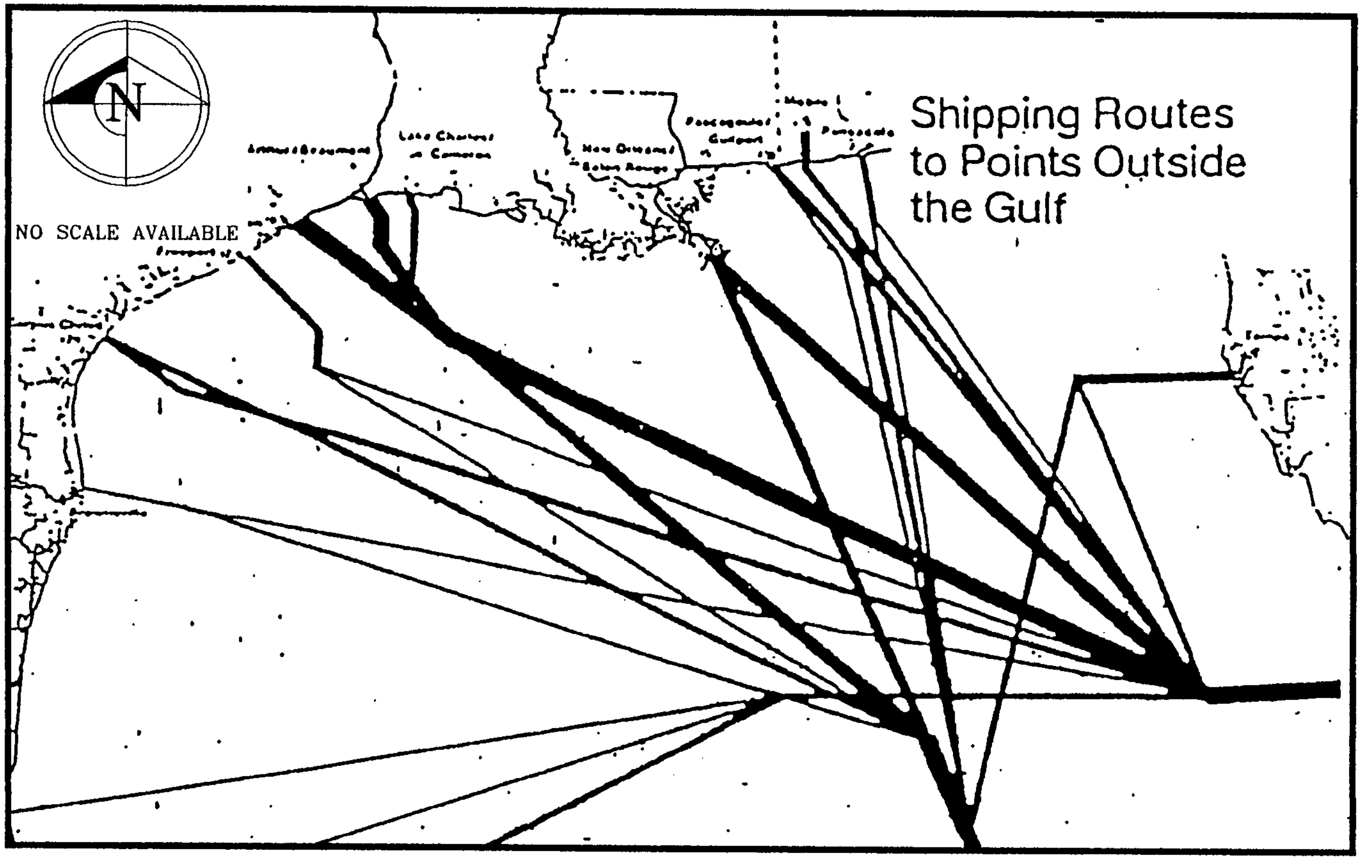


Figure 19. Map of present day shipping routes to points outside of the Gulf of Mexico. From Garrison *et al.* 1989

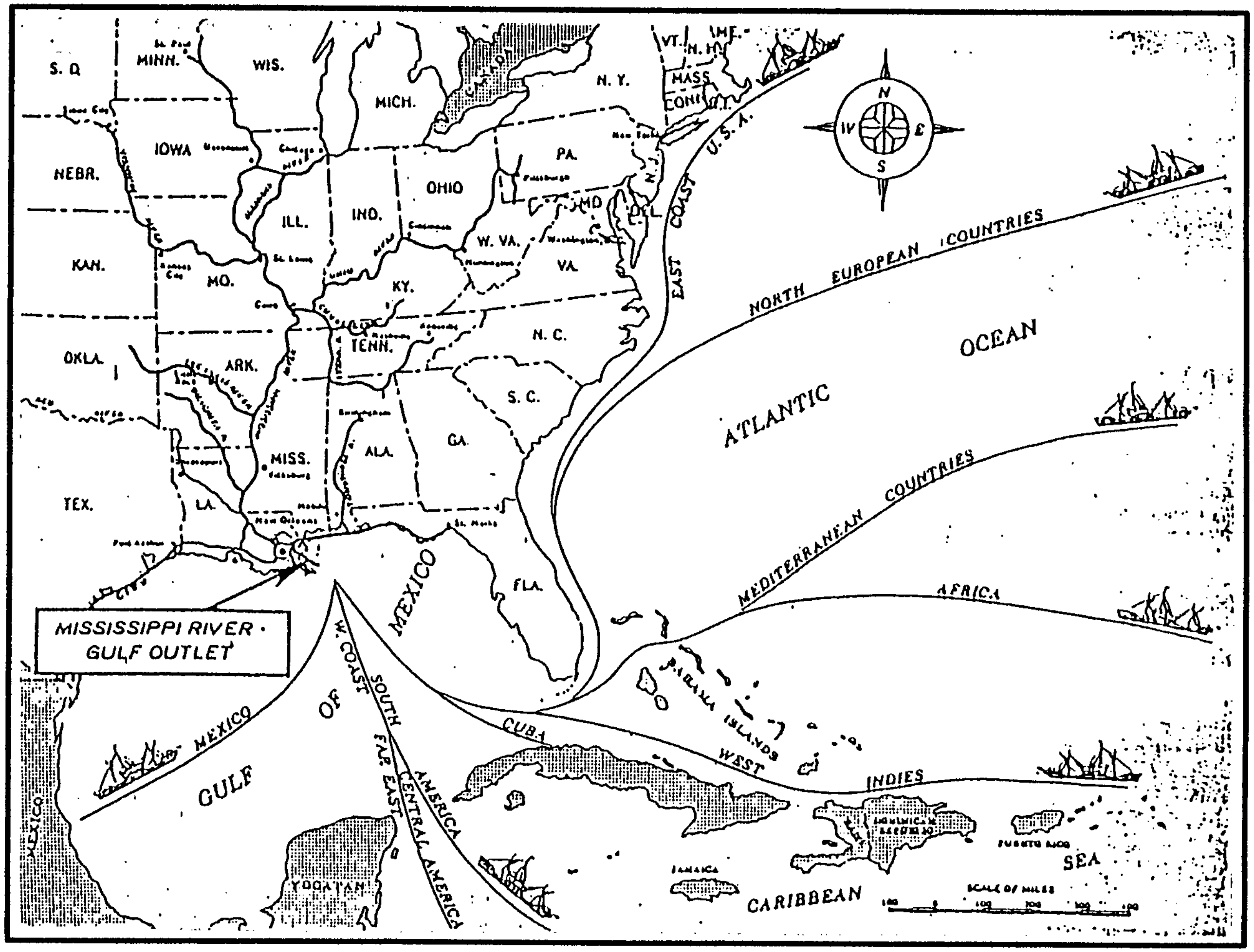


Figure 20. Map of present day shipping routes to points south and east of the Gulf of Mexico. From Garrison *et al.* 1989

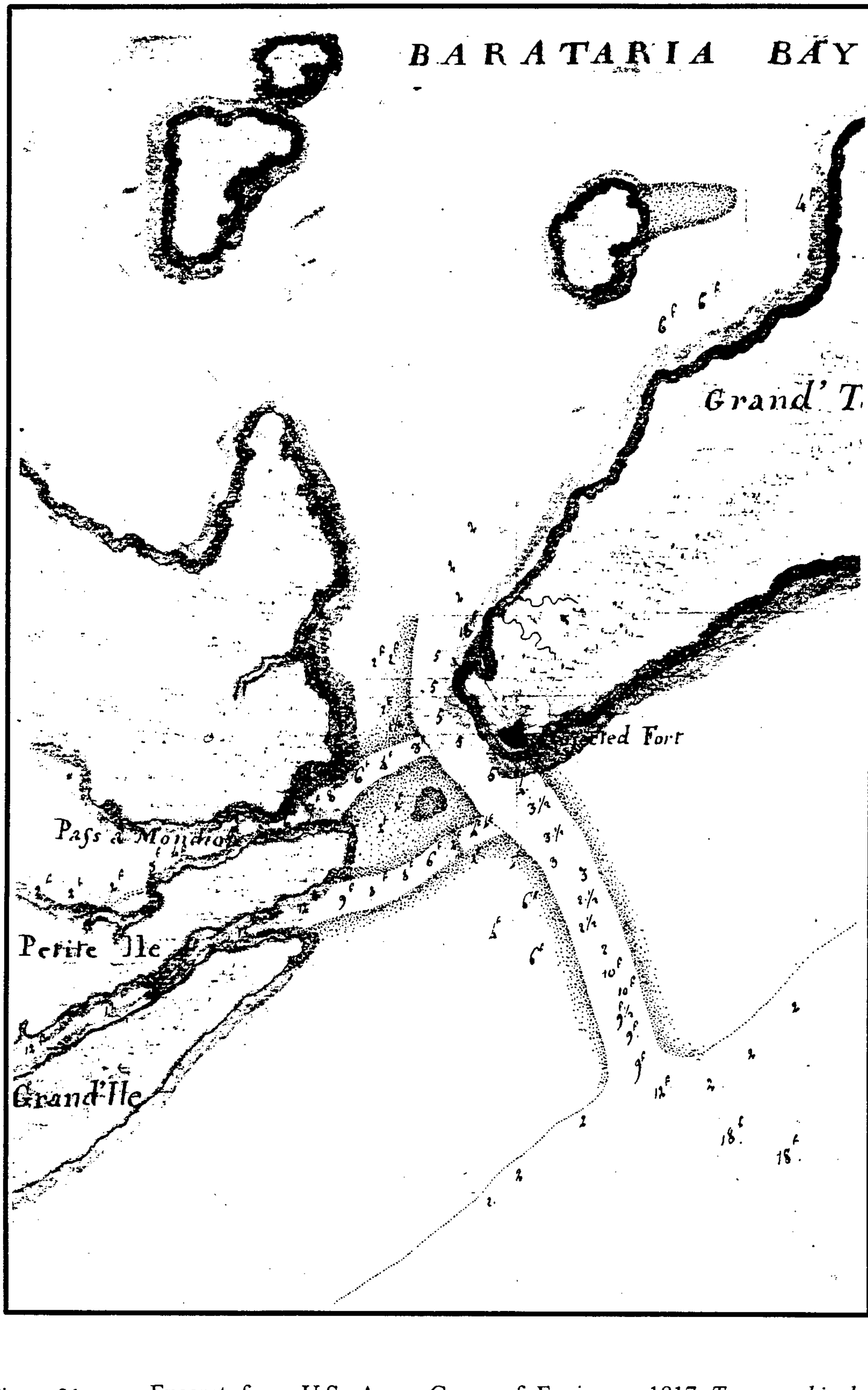


Figure 21. Excerpt from U.S. Army Corps of Engineers 1817 *Topographical Plan of Barataria Bay* map by D.F. Patterson, showing channel depths in Barataria Pass and the projected location of Fort Livingston on Grand Terre Island

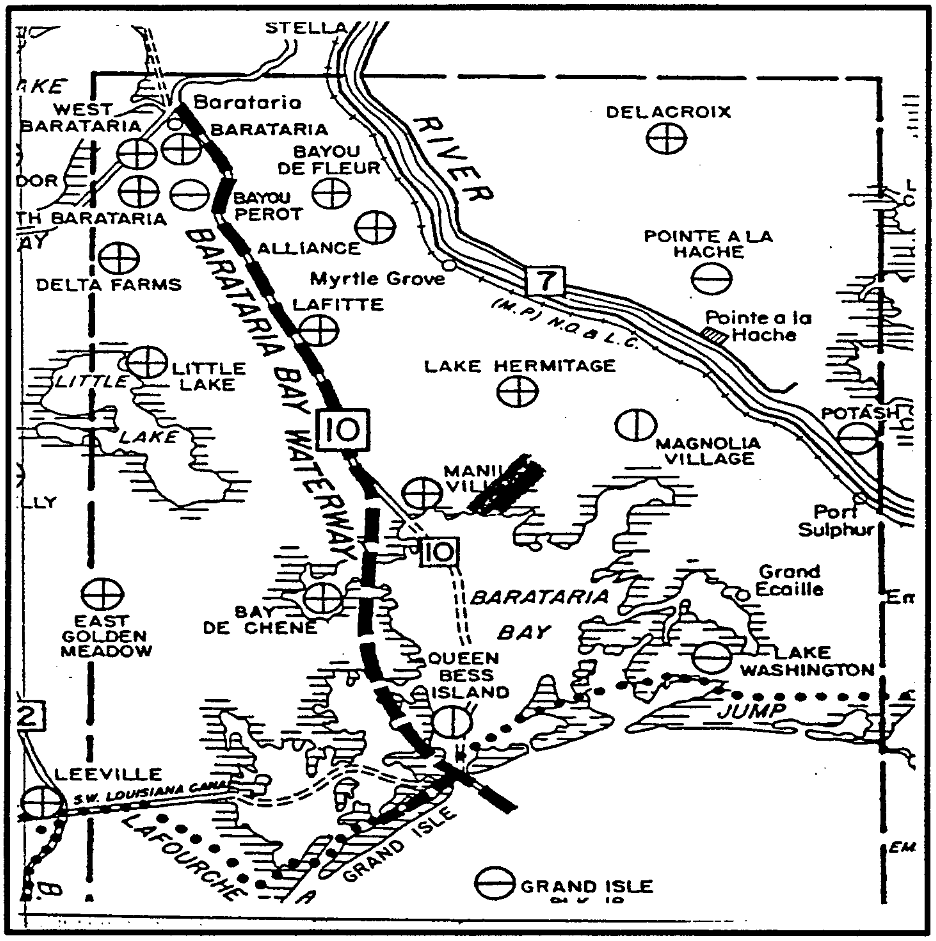


Figure 22. U.S. Army Corps of Engineers 1956 map, showing the route of the Barataria Bay Waterway and connecting waters, and oil and gas fields in the region of Barataria Bay. From U.S. Congress House Document *Barataria Bay Waterway, Louisiana,* vol. 31

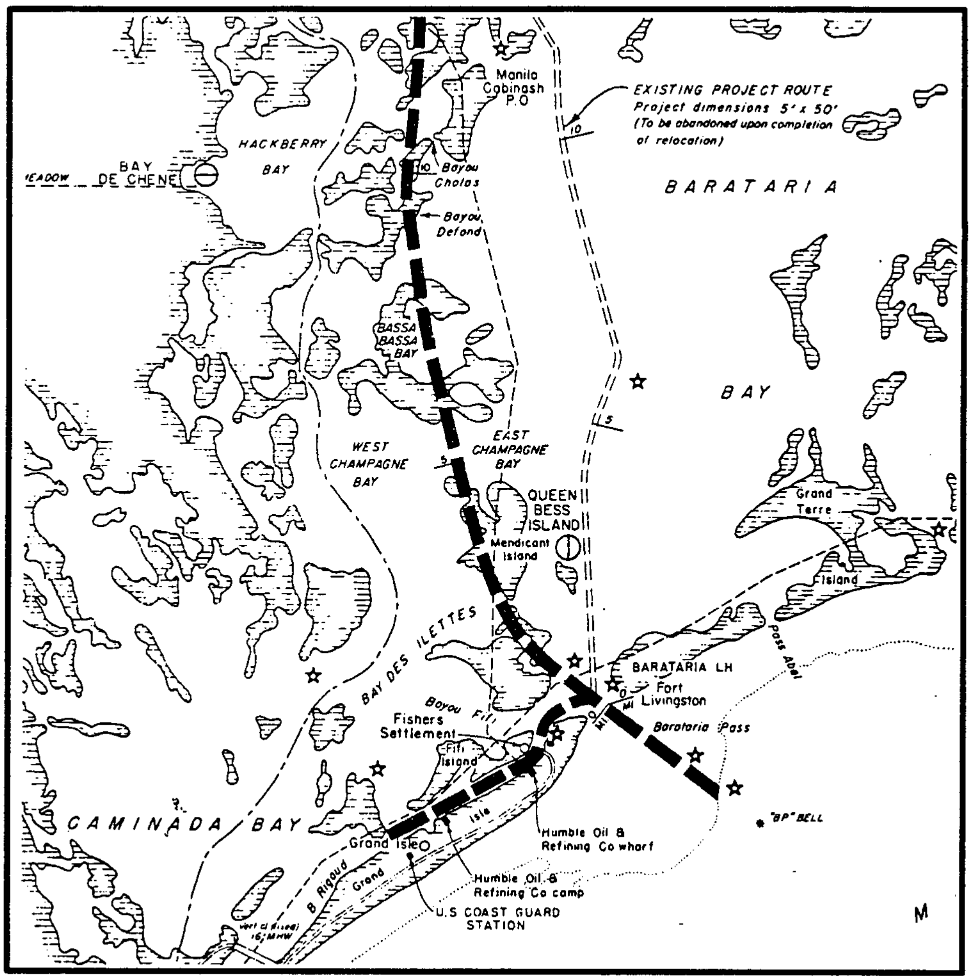


Figure 23. U.S. Army Corps of Engineers 1956 map of Barataria Bay Waterway, showing the route under construction. From U.S. Congress House Document *Barataria Bay Waterway, Louisiana*, vol. 31

Table 3. Chronology of Dredging and Shoreline Construction along the Barataria Bay Waterway (BBW)

(sources: U.S. Congress House Document 1956; U.S. Army Corps of Engineers 1999)

Date	Project	Dimensions of Project	Contractor	Dollar cost
8/17/1881	survey for BBW		US Corps Eng.	
10/18/1915	prelim. exam. for BBW		US Corps Eng.	
3/1/1917	survey for BBW		US Corps Eng.	
3/2/1919	dredging of BBW from Bayou Villars to Grande Isle	5' deep 50' wide 37 mi long	US Corps Eng.	
1925	completion of BBW		US Corps Eng.	73,037.11
12/7/1935	prelim. exam. for BBW		US Corps Eng.	
1/1947	dredged offshore bar of Pass to 12' contour	12' deep 200' wide 7,200' long	Humble Oil Co.	75,000.00
1/1947	channel from Pass to dock at Bayou Rigaud; channel from Bayou Rigaud to camp	12' deep 125' wide 0.6 mi long; 8' deep 100' wide 1.6 mi long	Humble Oil Co.	1,500,000.00
1/29/1948	prelim. exam. for BBW		US Corps Eng.	
1948	hurricane shoaling of offshore channel of Pass dredged		US Corps Eng.	35,000.00
1951-1952	14 timber groins along Gulf side of Grand Isle for beach erosion		Dept. Highway, LA	480,000.00
6/30/1954	maintenance of BBW to date		US Corps Eng.	47,550.83
8/1954	offshore channel of Pass dredged		US Corps Eng.	100,000.00
11/31/67	Pass widening		US Corps Eng.	
12/29/1967	Pass widening completed		US Corps Eng.	
NA	numerous canals and channels dredged to oil wells		oil companies	
NA	wharves at Grande Isle along Bayou Rigaud, Dupre Cutoff		private; oil companies; shrimping concerns	

other important events impacting the cultural landscape surrounding Barataria Pass.

Export/Import Commodities at the Ports of New Orleans and Mobile. Although Barataria Bay does not have a major port on its shore as Mobile Bay does, both are similar in that commerce produced from local resources traversed the waters of both bays heading towards their respective major ports where the local merchandise was handled for consumption or export. While both bays shared in the wider economy of the northern Gulf of Mexico, the port at Mobile City was a customs district. From the records at the Mobile Customs District, it is possible to see the types of commodities traded, to compare them with the New Orleans Customs District, which was Barataria Bay's focus of trade, and to witness the change in commodity types, which reflected the growth of settlements in the lower South and changes in manufacturing technology.

Commodities first were registered at Mobile and then either unloaded there or transported to other ports on the Gulf. Domestic ports of origin were either on the Gulf (Pensacola, New Orleans) or the East Coast (New York, Philadelphia). Foreign ports of origin were in Latin America, the Caribbean, Western Europe, and,

Table 4. Summary of Cargo Types Arriving at the Customs District, Mobile, Alabama for the Years 1814 to 1920

(sources: Mobile Customs District cargo invoices and registers of imported and exported commodities, 1814-1920)

Food Products	Fabric Products	Other Products	Raw Products
Unprocessed	***Unfinished***	***Unfinished***	
Animal: fish, oysters	*Cotton:* cloth, fabric, lace, platillas, twill, shirtings, cambric, checks, bombast, muslin, Marseilles yarn, jean, hollands, calicoes	*Fiber:* paper, leaf tobacco, wood, hardwood, lumber, timber, istle grass, sisal grass, hair, hay	*Animal:* animals, birds, fowls, parrots
Fruit: apples, limes, oranges, bananas, coconuts, pineapples			*Chemical:* acid, chloroform, caustic soda, petroleum, red ochre
Processed			
Animal: beef, ham, cheese, butter, hog products		*Metal:* copper, sheet steel, bar iron, brass, Swedes iron, iron rails, steel plates, steel rails	*Mineral:* bituminous coal, stone, guano phosphate kanite, iron pyrites, potash, asphalt; stone ballast, fertilizer
Beverage: brandy, champagne, rum, gin, sherry, port, whiskey, beer, tea, coffee	*Other cloth:* britanias, linens		
	Finished	*Misc.:* dry hides, India rubber, cement, conch shells, glass	
	Apparel/fabric: hose, handkerchiefs, gunny bags, shawls, millinery		
Condiments: brown sugar, white sugar, molasses, salt, pepper		***Finished***	
		Hardware: nails, bolts, nuts, spikes, files, deck engine	
Fruit: raisins		*Tableware:* cutlery, earthenware, plates, pewterware, glassware, decorated porcelain	
Grains/legumes: rice, flour, split peas, cornstarch		*Misc.:* anchors, soap, cigars, engine oil, linseed oil, paint, misc. arms, gold coins, buttons, combs, mineral oil, staves, shooks	

occasionally, from Asia (Goodwin et al. 1999). Invoices and registers for commodities brought into the Customs District, Mobile, Alabama, for the years 1814, 1890 to 1892, and 1920 (Table 4), show that cargoes consisted of food, clothing, construction materials, and industrial support products. During the early years, many of the imported materials were unfinished and were meant to be processed once distributed from the port of entry at Mobile. The great variety of cotton materials listed in ships' manifests for 1814 at the Mobile Customs District likely were destined for the growing number of settlers coming to Alabama after the Creek Indian War in 1814; 1813 and 1814 marked the introduction of the power loom and with it the mass production of cotton fabrics (Oliver 1956). Iron, steel, and other imported construction products listed in the customs invoices were likely meant for the growing frontier of Alabama and Mississippi.

The cargo manifests and invoices show a slow evolution from a market economy that continued to be dependent on imported food consumables, while shifting from an agricultural base to a processing and manufacturing based economy. During the period of 1890 to 1892, food items, construction products (iron, nuts, bolts, nails, and cement), materials for further processing (dry hides, India rubber, old brass and copper, and wood), coal to fuel industries, and fertilizer for agriculture were being traded.

Invoices for 1905 included items for a growing industrial market: engines, petroleum, oil products, and chemicals. By 1920, principal commodities handled in Mobile included wood products, coal, molasses, mineral oil, bananas, wheat flour, steel plates, steel rails, sand and gravel, cooperage shooks, staves, and cotton. These commodities continued to support an economy that produced raw materials while consuming building materials as the society slowly industrialized. The materials handled at the Port of Mobile were typical of markets along the northern Gulf of Mexico. They were exchanged between markets found in the interior of the United States with markets in Latin America, Europe, and Asia (Goodwin et al. 1999).

The commodities imported into Mobile from 1814 to 1905 were typical of port imports for the period along the northern Gulf coast. The leading indicator of principal commodity types shipped from the Gulf is New Orleans, the largest port in the Gulf of Mexico. In 1914, the same commodity types were recorded as being handled in New Orleans as in Mobile during the previous years; the principal items imported were: coffee, sugar, sisal, burlap, bananas, and kainit and fertilizers; principal exports were cotton, wheat, tobacco, lumber staves, cotton seed, meal and cake (Davis 1913; Baughn 1950). Table 5 summarizes principal import and export commodity types handled at the Port of New Orleans.

<u>Shipwreck Types</u>. NOAA Nautical Chart No. 11352/1995 identifies seven shipwrecks within two miles of Barataria Pass ODMDS (Figure 24)(Note that one wreck is not depicted on Figure 24). Consultation at NOAA in 1999 to gather the latest information on wrecks in the project area provided a chart (Figure 25) showing eight wrecks (Note that one wreck is not depicted on Figure 25). The two NOAA charts are essentially the same, except for the addition of one wreck, which is located approximately half a mile west outside the ODMDS. There are only two wrecks that are located in the survey area; one wreck is totally within the Barataria Dump site at the southern end and one wreck is only partially situated in the survey area on the north west boundary of the Barataria Dump site. NOAA's AWOIS database references only six wrecks out of the eight known wrecks that lie within two miles of the ODMDS. The two wrecks that are situated within the survey area are unidentified and only one of the six wrecks referenced is identified, the *Barbara Jean* AWOIS Record No. 361 (Table 6). The two wrecks that are not referenced in the AWOIS database are depicted on the NOAA charts.

<u>Obstructions to Shipping in the Barataria Bay Area.</u> Shipwrecks can be categorized by *type of incident* (how), and by *place of incident* (where). Incidents that caused ships to wreck include going ashore, burning, being stranded, foundering, colliding, exploding, and scuttling. Location of wreckage incident would be dependent on natural conditions (such as shallowness, shoals, weather, etc.), and obstructions caused by man. Many man-made obstructions in the Barataria vicinity include vessel wrecks (both submerged and visible), submerged pipes, cable areas, spoil areas (dredged materials), and dump sites. Man made obstructions are numerous and may require special efforts to eliminate them. In the area of dredged channels, shipwrecks do occur and must be dealt with as special items. A wreck could be moved, or if the job of moving it is too difficult or costly, a new channel may be dredged to avoid lifting the wreck entirely (See Tables 7, 8, and 9 for listings of obstruction types).

Shipwreck types are representative of the ship types in use during various periods of history in the Gulf. During the 1800s, two main types of vessels carried goods to and from ports throughout the Gulf: the schooner and the steamer. In the 1900s, the predominant ship types gradually changed from the schooner and the steamer, both of which were used into the 1920s, to gas and oil-powered vessels (screw-driven), yachts, and fishing vessels, which appeared in the 1960s. Other sunken vessel types included tugs, barges, dredges, and a pile drivers. (See Table 10 for a complete listing of ship types

Table 5. Principal Import and Export Commodities Port of New Orleans, 1914-1944

(sources: Davis 1915, McChesney 1920, Board of Commissioners 1925, Parker 1924, Board of Engineers 1944)

Year/ Products	1914		1920		1923		1924		1944	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
Food & consumables	wheat, tobacco	coffee, sugar, bananas	grain	coffee	wheat, flour, tobacco	coffee, sugar, bananas	sugar, molasses, rice, salt		fish, mollasses, cattle, grain	tropical fruit, vegetable oils (coconut, palm, olive)
Chemicals		kainit, fertilizers	creosote, crude oil	pyrites, nitrates	various, mineral oil	nitrates, mineral oil	creosote, crude oil, sulfur, gas, coal tar, lime stone, gypsum, waste for paper pulp	various	petroleum products, bauxite, linseed oil, neat's foot oil	
Materials	cotton, cotton seed, meal, and cake, lumber	burlap, sisal			all wood, cotton	mahogany	hardwoods, pine	hardwoods		
Manufactured goods	staves		steel		machinery		wood working plants			

that sailed in the Gulf of Mexico from 1500 to the 1980s).

During the eighteenth and nineteenth centuries, schooners were developed in the United States to utilize on and offshore winds (Howard 1979). Two principal classes of cargo schooner were developed: a smaller version with fuller lines, and sharper lined, taller-rigged vessels used at times by smugglers and privateers (Faye 1940). In later centuries, it also developed into the classic fore-and-aft rigged ship with up to six masts. The schooner design continued to dominate coastal traffic in 19th century, and it continued in use well into the 20th century (Nevins 1946:5; *Sea Technology* 1986). The schooner, the predominant vessel on the seas, remained in fishing fleets up to 1933, when law changes permitted oyster dredging with motor vessels (Mistovich and Knight 1983).

Sloops encompassed three kinds of vessels in the eighteenth century: the single-masted sloop, the 5-masted sloop (variants being called snows, brigs and ketches), and the 3-masted ship sloop. Snows had no midden mast, and ketches had no foremast. Many sloops had an unbroken sheer of their main deck (Howard 1979), and were square-rigged. During the nineteenth to twentieth centuries, ship types changed. The bark was a vessel with all masts square-rigged except the midden.

While the schooners continued in use in the Gulf up to World War II, steamers

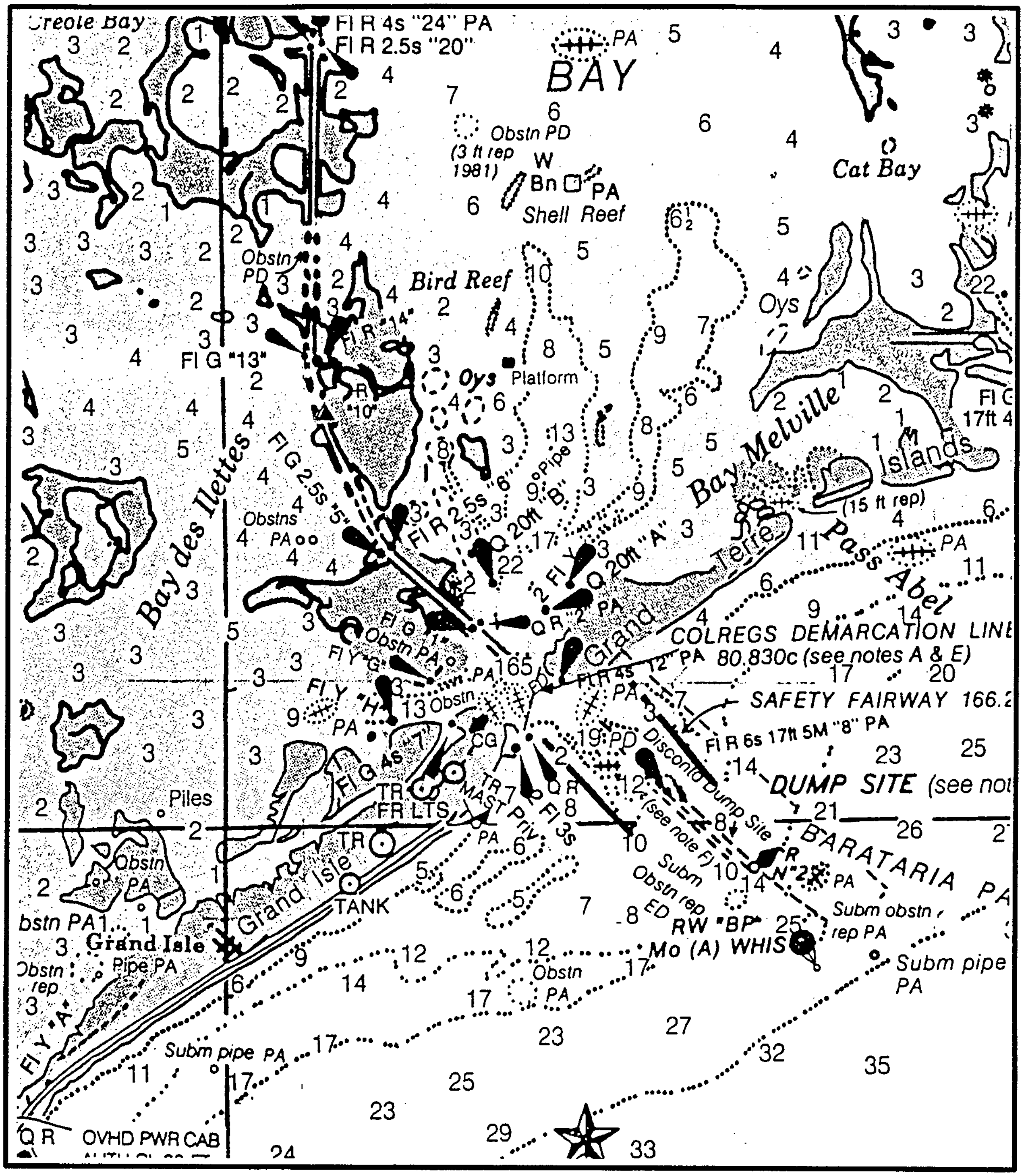


Figure 24. Excerpt from NOAA 1995 *Intercoastal Waterway, New Orleans to Calcasieu River, East Section* chart (no. 11352), showing shipwrecks in the vicinity of Barataria Pass

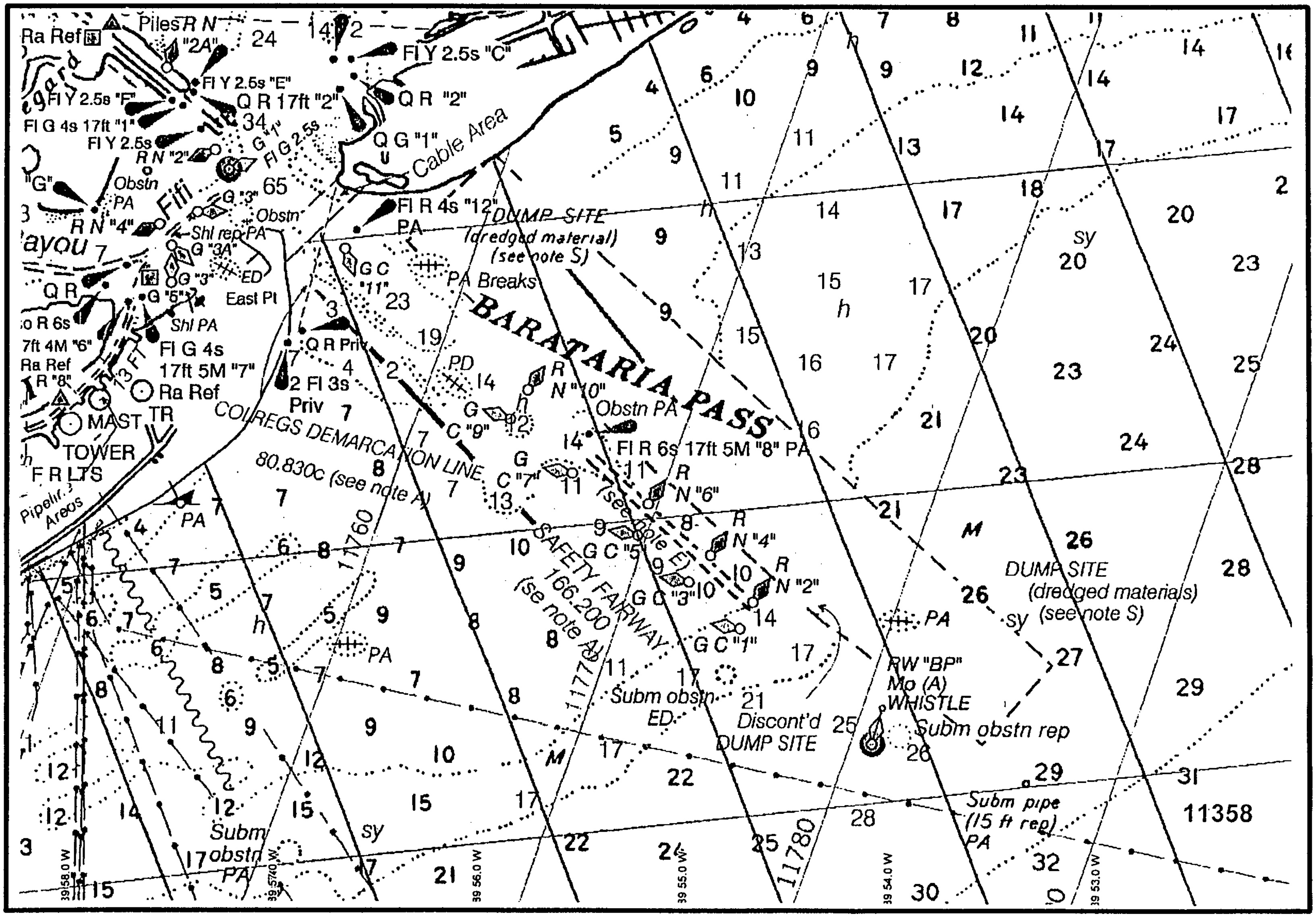


Figure 25. NOAA 1999 AWOIS chart of shipwrecks in the vicinity of Barataria Pass

Table 6. Shipwrecks Along the Coast of Louisiana, Including Barataria Pass

Vessel/ Obstruction Name	Vessel/ Obstruction Type	Year Built	Tonnage	Dimensions	Date Lost or Reported	Cause	Location (all positions approximate)	Notes & References
Atlantic					1954	sank	**29-20-00N, 92-23.8**	Lonsdale
Barbara Jean	oil screw fishing vessel (wooden)	1947	57	55.3 ft long 16.8 ft wide 7.1 ft deep	5/21/64	burned	**29-15-36N, 89-51-36W** (NAD 1927)	AWOIS record No.: 361; owner: Lawrence Falgout, Golden Meadow, LA (AWOIS); Berman; Notices to Mariners 24/64
Bayard			2,160		7/6/42	torpedoed	reported variously at: **29-19-00N, 88-50-00W,** **29-35-30N, 88-44-00W**	in 150 ft of water; 2,200 tons of cargo (Lonsdale); Chart C.S. 1007-A
Belle	trawler				1953	wrecked	**29-45.2N, 93-07-00W**	Lonsdale
Benjamin Brewster	tanker (steel)		5,950; also as: 3,677		7/9/42	torpedoed	reported variously at: **29-03-00N, 90-09-00W,** **29-05-00N, 90-05-00W** (NAD 1927)	AWOIS record No.: 319; (Chart 1007-A); in 15 ft of water; 26 lives lost; wreck demolished (Berman); in 36 ft of water; cargo: aviation gasoline, lube oil (Lonsdale)
Caribe	barge				12/19/54	sank	**29-06.9N, 91.43.3W**	Lonsdale
City of Toledo (or *Cities Service Toledo)*	tanker		8,192; also as: 5,128		6/12/42	torpedoed	reported variously at: **29-04-00N, 91-43-00W,** **29-02-00N, 91-59-00W**	in 12 ft of water; visible 4 ft above water (Lonsdale); Notices to Mariners 32/42; Chart C.S. 1007-A
David McKelvy	stern screw tanker (steel)	1921	6,820		5/14/42	torpedoed	reported variously at: **28-55-10N, 90-35-00W,** **28-55-00N, 90-20-00W**	17 lives lost; cleared to acceptable depth (Berman); cargo: 80,000 barrels light crude oil (Lonsdale); Chart C.S. 1007-A
Dr. H.E.White	trawler				7/25/54	sank	**29-08-00N, 92-35-00W**	Lonsdale
Edgar F. Coney	steam screw freighter	1904	153		1/28/30	sank	**29-22-00N, 93-00-00W**	Lonsdale; all (14) lives lost (Berman)
El Vivo	steam screw (steel)	1902	199		4/24/45	foundered	**29-10-00N, 90-00-00W** (NAD 1927)	AWOIS record No.: 319; at 9 Mile Point, opposite Westwego, LA (Berman)
Frances	oil screw (steel)	1947	178		4/23/58	foundered	3 mi SSW of Grand Isle	Berman
Halo	steam screw tanker (steel)	1920	4,301; also as: 6,986		5/20/42	torpedoed	reported variously at: **28-47-00N, 89-49-00W,** **28-42-00N, 90-21-00W,** **28-42-00N, 90-08-00W,** 21 mi SW of SW Pass	39 lives lost (Berman); in 140 ft of water (Londsdale)

Vessel/ Obstruction Name	Vessel/ Obstruction Type	Year Built	Tonnage	Dimensions	Date Lost or Reported	Cause	Location (all positions approximate)	Notes & References
Hamlet (Norwegian)	steam screw tanker (steel)		3,994		5/27/42	torpedoed	**28-32-00N, 91-30-00W**	Berman; in 126 ft of water (Lonsdale)
Heredia	freighter (steel)		4,732		5/19/42	torpedoed	reported variously at: **28-30-15N, 90-59-30W,** **28-30-25N, 90-59-30W,** **28-33-30N, 90-58-30W,** **28-29-00N, 91-02-00W,** capsized and on fire at: **28-32-00N, 90-59-00**	in 100 ft of water; cargo: 1,500 tons gen. cargo (Lonsdale); 25-75% of lives lost (Berman); Chart C.S. 1007-A
Leo Huff	oil screw	1941	157		12/5/47	burned	**29-35-00N, 93-14-00W**	Lonsdale; Berman
Kermac XVI	oil screw	1943	68		8/2/55	foundered	**29-15-00N, 89-55-00W**	Berman
Last Chance							**29-18-00N, 89-49-00W** (NAD 1927)	AWOIS record No.: 374
Louisiana	freighter					sank	**28-59.20N, 89-08.1W**	Lonsdale
M/V Coral Faye			111		11/27/59	burned and sank		on Tiger Shoals (Lonsdale)
My Baby							**29-27-10N, 89-42-39W** (NAD 1927)	AWOIS record No.: 766
Nelly Rose	oil screw	1954	52		9/24/1965	foundered	approx. 20 mi. SE of Grand Isle	Berman
Pearl Harbor	fishing vessel				1955		reported variously at: **29-19-00N, 89-49-24W,** **29-15-58N, 89-49-26W** (buoy position) (NAD 1927)	AWOIS record No.: 364, 378; 22 ft over wreck (Lonsdale); 200 ft, 45 deg. from buoy; 22 ft water over wreck (AWOIS); Notices to Mariners 21/55
Pioneer	barge				1954	sank	**29-08-00N, 91-41.9W**	Lonsdale
Polaris	trawler				2/14/56	sank	**29-21.4N, 91-55-00W**	Lonsdale
Ramos III	trawler				11/21/55	sank	**29-24.3N, 92-01-00W**	in 12 ft of water (Lonsdale)
R.W. Gallagher	steam screw tanker (steel)		7,989		7/13/42	torpedoed	**28-32-00N, 90-59-20W**	in 90 ft of water; cargo: 83,000 barrels of bunker "c" oil (Lonsdale); 8 lives lost (Berman)
R..M. Parker (or: *R.M. Parker, Jr.*)	steam screw tanker (steel)		6,779		8/13/42	torpedoed	reported variously at: **28-47-00N, 90-45-00W,** **28-50-00N, 90-42-00W**	bow projected out of water (Chart C.S. 1007-A); Lonsdale; Berman
Rawleigh Warner	steam screw tanker (steel)	1912	3,663; also as: 2,228		6/22/42	torpedoed	reported variously at: **28-53-00N, 89-15-00W,** **28-57-00N, 89-13-00W,** **28-53-00N, 89-13-00W**	in 266 ft of water; cargo: 38,909 barrels of gasoline (Lonsdale); Chart C.S. 1007-A

Vessel/ Obstruction Name	Vessel/ Obstruction Type	Year Built	Tonnage	Dimensions	Date Lost or Reported	Cause	Location (all positions approximate)	Notes & References
Shoal Harbor	oil screw trawler	1945	194		10/23/55; or: 9/29/55	sank	reported variously at: **29-27-00N, 92-37-00W, 29-30-00N, 92-38-00W,** 10 mi offshore	in 36 of water (Lonsdale); Berman
Sheherozada (or: *Sheherazade*) (Panamanian)	steam screw tanker (steel)		13,467; also as 7,015		3/10/45; also on 6/11/42	torpedoed	**28-42-15N, 91-23-00W**	in 70 ft of water (Lonsdale); Berman; 300 ft S of Ship Shoal Wreck Lighted Buoy 3; no longer navig. menace by 4/11/44 (Notices to Mariners 19/44)
Tony S	fishing vessel					sank	**29-15-00N, 89-50-00W** (NAD 1927)	AWOIS record No.: 358; in 32 ft of water (AWOIS)
U-166	German submarine		740		8/1/42	sank	**28-47-00N, 90-45-00W**	in 60 ft of water (Lonsdale)
Virginia	steam screw tanker (steel)	1941	8,472 and 10,731 (AWOIS)		5/12/42	torpedoed	reported variously at: **28-53-06N, 89-26-42W, 28-53-00N, 89-29-00W** (NAD 1927)	AWOIS record no.: 290; Naval record no.: 36,000; 27 lives lost (Berman); cleared w/o hang to 54 ft; in dump site; no longer charted; located in 1950; wreck silted over by 1943 (AWOIS); Notices to Mariners 2/44
West Beufort (or: *West Beaufort)*	oil screw trawler	1938	119		11/28/53; also on: 8/10/53	sank; or: burned	**29-43.0N, 93-14.3W**	Lonsdale; about 5.5 mi SE of Calcasieu Pass, LA (Berman)
Yuma	steam screw freighter				3/17/26	sank	**28-56.6N, 89-26.6W**	visible above water (Lonsdale)
unknown							**29-20-00N, 89-57-10W**	E end of Grand Isle in Barataria Pass (NOAA chart 1999)
unknown							**29-16-10N, 89-57-15W**	NE shore of Grand Isle (NOAA chart 1999)
unknown							**29-15-00N, 89-59-00W**	visible above water, SE shore of Grand Isle (NOAA chart 1999)
unknown							**29-14-15N, 89-56-15W**	alongside a 5 ft deep shoal (NOAA chart1999)
unknown							**29-15-30N, 89-56-00W**	alongside SW boundary of the Barataria Pass dump site (NOAA chart 1999)
unknown							**29-16-00N, 89-56-15W**	on the NW boundary of the Barataria Pass dump site (NOAA chart 1999)
unknown							**29-14-30N, 89-54-00W**	within the S end of the Barataria Pass dump site (NOAA chart 1999)
unknown							**29-17-18N, 89-53-01.80W** (NAD 1927)	AWOIS Record No.: 368; 3 ft above water (Notices to Mariners 45/68); wreck now not visible (AWOIS)

Table 7. Obstruction Types (other than vessels) Barataria Bay and Pass

(source: NOAA nautical chart nos. 1116A, 11352, AWOIS 1999, and U.S. Congressional House Document 1956)

Obstruction Type	Materials	Location
Nautical Chart Categories:		
covered wells	unspecified	throughout area
dump site (area active and discontinued)	dredged materials	the project area
foul	tree stumps, stakes, pilings	along Barataria Bay Waterway
marker	unspecified	throughout area
obstruction	unspecified	throughout area
platform (oil and gas fields)	unspecified	throughout area
shoaling	sea bottom	throughout area
spoil area	channel dredgings	along all channels in the area
submerged cables	unspecified	between E end of Grand Isle and W end of Grand Terre Island
submerged obstructions	unspecified	SE end and along SW edge of project area
submerged pipes	unspecified	from SW to SE of Barataria Pass

Table 8. Possible Bottom Obstruction Types from Industrial, Commercial, Military, and Other Sources

(source: Coastal Environments, Inc., 1977)

Obstr. Type	Materials	Obstr. Type	Materials	Obstr. Type	Materials
Industrial		**Commercial Mariners**		**Miscellaneous**	
bridge debris	concrete, metal	anchors	metal	artificial reefs	various
cables	metallic core	chains	metal	automobiles	metal
chains	metallic core	equipment	metal	concrete forms	concrete
drilling bits	metallic core	fishing tackle	metal, plastic	tires	rubber
drums	metal	nets	fiber, plastic	etc.	
lost/broken tools	metal	various junk	various		
oil wells	metal				
pipe stems	metal				
pipelines	metal				
spoil areas	channel dredging				

Table 9. Confederate States Obstructions Engineered During the Civil War Mobile Bay, Alabama

(source: Irion 1985, 1986)

Obstruction Type	Materials	Intent of Obstruction	Location
sunken vessels	loaded with brick	blockade channel	Dog River Bay; generally employed in shoal waters; with underwater mound
sunken hulks	vessels	blockade waterway	generally employed
wreck stakes	wood	part of sunken vessel obstructions	primarily by Mobile City
booms: chain and cypress raft; crib-work; logs; ropes	iron, wood, stone, fibers	blockade channel	between Forts Morgan and Gaines
elongated mound	handmade bricks	blockade river	mouth of Mobile River
piles	wood	blockade waterway	between Choctaw Point spit and Spanish River shoal
main & floating batteries	some plated with railroad iron	cover pilings and sunken hulks	Choctaw Point spit to Spanish River
floating mines		sink vessels	generally employed in Bay area

continued until the 1920s. They appeared in a number of different versions. The sidewheel paddle was used in rivers; this vessel design had a shallow draft with a light hull and usually was driven by a high pressure steam engine or engines turning two side paddles. Sidewheelers were common in the mid-late 19th century coastal trade. Sternwheel steamers, also river boats, eventually supplanted sidewheelers on rivers. They were less effective on the Gulf, where the sternwheel often was lifted out of the water because of wave action. The popularity of the sternwheel design lay in its narrower breadth, which meant easier use on bayous, canals, and along the coast.

Other steam vessel types, such as the paddle and screw propeller, were developed in the mid-to-late-19th century. The paddle had a deep draft keel and balanced rudders. Early versions were all wooden, but iron and steel hulls supplanted wood by the turn of the century. Some of the mid-late 19th century vessels maintained a sail rig either fore-and-aft, or schooner style. The screw propeller had a deep draft, and a keeled hull with a propeller. It supplanted paddle designs by late 19th century, due to its greater propulsion efficiency. Screw propellers were the classic cargo ship design after 1914, with a steel hull separated by watertight bulkheads, a deckhouse amidships, and masts rigged as booms for unloading. Their common size was 16,000 dead weight tons, with lengths of up to lengths of 350 feet.

German submarines were responsible for the sinking of Allied shipping found along the northern coast of the Gulf from 1942-1944. The tanker vessel constituted the principal target of German submarines in the Gulf of Mexico during World War II. No U-boats sunk by Allied forces were found in the vicinity of the project area at Barataria Pass (Rohwer 1983).

Military Action

<u>The Civil War</u>

The degree or complexity of maritime defensive works constructed at Fort Livingston during its occupation by Confederate forces is not known. But to the

Table 10. Ship Types in the Northern Gulf of Mexico 1500-1980

(sources: Wilson 1983; Garrison et al. 1989)

Rig	Origin	Purpose	Propulsion	Size (Approx.)	Notes
1500-1699					
bark (barque)	French		square, rectangular sails; 3 masts	100' long; 370 tons	prevalent after 1585
bateau ("boat")	French		some had square sails; 1 mast; rowed or poled	18-85' long	flat bottom; developed into dory
bilander	French		square sails; 2 masts	100-150' long	
biscayan	French		sails; 2 masts		longboat or chaloupe
brigantine	French Spanish British		square sails; 2 masts		Span. b. equivalent to British pennace
bullboats	French				canoe made of hides
caiche	French		sails; 2 masts		Eng. "ketch"; name changed to "schooner" in 1700s
canoe	French			12-36' long; open	made of wood, hides, or dugouts
canots maitres (grand canots, piroques)	French	exploration, trade	some had sails	up to 50' long; open	
caravel	Spanish	exploration, trade	lateen sails; 3-4 masts	10-50 tons	used from 1500 to 1650, replaced by navios and larger galleons
carrack	Spanish	warship, merchant	sails; up to 3-4 masts	150-1500 tons	cannon plus infantry weapons
chaloupe	French	exploration, trade	sails; 2 masts	18-28' long	Eng. "shallop", Span. "lancha", "longboat"
corvette (sloop of war)	French	warship	square sails; 3 masts		not sloop rigged; used more by Fr. and Amer. than Brit.; smaller than frigate
felucca (felouqe)	French	warship	lateen sails; rowboat	100' long; 370 tons	
flatboat (bateau plat, radeau	French		square sails; 1-2 masts; poled		used on rivers or protected waters; similar to Amer. "scow" and "gondalow" or "gundalow"
flyboat (filibote, fluyt, flute)	Spanish	cargo	square and lateen sails; 2 masts	180-400 tons; 90-140' long	used regularly in trade from 1580 to 1640
frigate (fregate, =Span. fragata)	French	warship		small, fast	carried messages; equi. to Brit. "Sixth Rate Ship"; popular from 1575 to 1645 in Spanish trade
galleon	Spanish	warship, armed merchant	lateen sails; 3-4 masts	100-200' long	with naos, dominated Sp. trade after 1520s
galley	Spanish	warship (coastal defense)	sail-oar hybrid; lateen sails	60' long	later designs in Gulf and SE had 14 oars, 18 cannons
hooker, hourque	Spanish	supply, cargo		small, medium	infrequent from 1550 to 1650
ketch (catch, caiche(?))	French		sails; 2 masts	70-130' long	foremast taller than main mast
launch (=Span. lancha)	French		sails; rowed	small; open	name "launch" replaced "shallop" and "longboat" after 1740s

Rig	Origin	Purpose	Propulsion	Size (Approx.)	Notes
longboat (chaloupe)	French		sails; 2 masts; rowing	52' long	a ship's boat
nao	Spanish		sails; 2 masts	150-1500 tons	similar to carrack, but no foremast
pinnace	French		various types of sails; rowed	30-50' long	similar to but larger than launch or longboat
piroque	French		rowed	25-30' long; open	dugout
traversier (smack)	French	freight, general purpose			
radeau	French	freight, general purpose			similar to flatboat
skiff		ship's boat		20' long	smallest of ship's boats
1700-1800					
balandra	Spanish		square sails; 2 masts	100-150' feet	Span. name for "bilander" (?)
bateau	English-American		some had square sails; 1 mast	40-85' long	flat-bottomed
bercha	Spanish			small	in use in 1780s
bergantine	Spanish		often lateen sails	small; open	of shallop or pinnace type
brig	English-American	sometimes for slaving	square sails; 2 masts	medium	abbreviation of "brigantine"
canoe	English-American			12-36' long; open	made of wood, hides, or dugouts
cutter (gig)	English-American	smuggling; law enforcement	sails; 2-3 masts	20-28' long	like "cutter" in late 1700s
dory	English-American		sails; rowed	16-20' long	may have developed from "bateau"
flat	English-American		rowed		used in sheltered waters
fragata (frigate)	Spanish	warship	sails	small, fast	carried armament on upper decks; carried messages; equi. to Brit. "Sixth Rate Ship"
galley	Spanish	warship, armed merchantman	sails; 3-4 masts	100-200' long; 60-70 guns, 600 men	
galliott (galeotta)	Spanish	warship	lateen sails; 16-20 oars		small galley
goleta	Spanish	mail; messenger	square and lateen sails; 2 masts	70' long	similar to schooner
gondalow (gundalow, gondola)	English-American	cargo	sails; poled		flat-bottomed; for rivers, lakes, bays; equi. to scow, flat, radeau
guairo	Spanish	mail; messenger	lateen sails; 1-2 masts(?)		similar to goleta (?)
Moses boat	English-American	lighter (for casks, hogsheads)	rowed	14-17' long; open	still in use in West Indies
navio	Spanish	warship	sails	60-70 guns; 500-600 men	
paquebot	Spanish	pack; transport	sails	18 guns; 140 men	
paranzello	Spanish		lateen sails; 1 mast		evolved into New Orleans lugger
periaqua	English-American		sails		used in West Indies
pink	Spanish		sails	small	rigged like a sloop, brigantine, ship, schooner; any small sharp-sterned vessel in 19th c.
polacre	Spanish		square plus lateen sails; 2-3 masts		
punt	English-American		rowed	20' long	flat-bottomed; common in 18th c.; form of scow
setia	Spanish		lateen sails; 2 masts		

Rig	Origin	Purpose	Propulsion	Size (Approx.)	Notes
schooner	English-American	various	gaff sails; 2-7 masts (majority: 2 masts)	30-375' long (majority: 60-120')	by 1790, national rig of U.S. and Canada
scow	English-American				flatboat; name appeared in 1800s
shallop (chaloupe)	English-American				replaced in late 18th c. by names: "longboat", then "launch"
ship	Spanish	warship, merchantman	square sails; 3+ masts	large	
skiff	English-American	gen. purpose	sails; rowed		flat or round bottom
sloop	English-American	warship; cargo	gaff sail; 1 mast; stay sail; 1-2 jibs	corvette size	
snow			identical to brig	100-150' long	
tender	Spanish	supply(?)	sails		
transport		gen. purpose(?)	sails	medium-large	
whaleboat	English-American	whaling; mail; light freight; passenger; privateers	sails	20-24' long	
wherry	English-American	passenger	rowed		
yawl	English-American		rowed; some sails; 1-2 masts	15-23' long	appeared approx. 1706
1800-1900					
Baltimore clipper	American	coastal trading; slaving	brig, brigantine, ship rigs used	90-120' long	developed about 1780; became model for coastal trading vessels (80' long max.)
bark (barque)		cargo	square sails; 3-5 masts (3 mast common)	102-155' long	late 1800s to after WWI; 3 mast common on European vessels in Gulf)
barkentine			square, fore-&-aft sails; 3-6 masts	medium-large	late 1800s to after WWI
bateau				20' long	New England dory type in Gulf from ca. 1875 to 1970; flat-bottomed
Bermuda sloop	American	various	square, gaff sails	66' long	West Indies-Bermuda sloop built in Chesapeake ca. 1740; sloop modified to schooner, then to Baltimore clipper
Biloxi schooner	American		sails; 2 masts	65' long	prob. Introduced from Atlantic ports, modified locally
Biloxi/New Orleans lugger	American	trade (fish, oyster, fruit, dominated by Spanish and Italians)	dipping lug sail; 1 mast	34' long	built in Mississippi
brig	American		various plans of square and fore-&-aft sails; 2 masts	medium	various hull forms: 2-mast schooner (1820-1850), clipper (1840-1850); not popular by late 1800s; fore-&-aft sail on foremast produced "brig schooner" or hermaphrodite brig"
catboat	American	fishing, recreation	sails		popular on Atlantic and in Gulf
cutter	American	Coast Guard	sails; 1 mast; steam		
dory (=bateau)	American				introduced into Gulf by New England snapper fishermen in 1875
flattie	American		sloop rigged	17' long	flat-bottomed; outboard rudder

Rig	Origin	Purpose	Propulsion	Size (Approx.)	Notes
gundalow (=scow)	American	freight	sloop or schooner rigged	25-35' long	popular on western Gulf after 1840
hermaphrodite brig (=brig)	American		variation on brig sail plan		
ketch	American		sails; 2 masts	small-medium	
Key West smackee	American	fishing	sloop rigged	17-26' long	outboard rudder
Louisiana oyster sloop	American	oyster	sloop rigged	36' long	used at Morgan City, Louisiana and possibly E of Mobile
packet	American	freight; passenger	sails; steam		Gulf vessel from ca. 1820 to 1927
pilot boat	American	meet incoming vessels	sloop or schooner rigged; raked masts	75' long	modified Chesapeake form used in Gulf in late 1800s
pinky	American	fishing	gaff sails; 2 masts	50' long	popular in New Englans, may have been used in Gulf
piroque	American	fishing, marsh hunting	rowed	10-12' long	in use from Colonial to present
river yawl boat (=river skiff)	American		rowed	18-24' long	in use ca. 1850 to 1925; flat-bottomed
schooner (=Biloxi schooner)	American		sails; 2 masts	65' long	prob. Introduced from Atlantic ports, modified locally
scow (=gundalow)	American		schooner rigged	25-35' long	used on south Atlantic rivers and western Gulf
shallop (chaloupe)	American		sails; 2 masts		ca. 1800-1940 were designed for sailing
sharpie	American		various sail plans: cat, sloop, schooner, yawl, cat-ketch	20-65' long	originally flat-bottomed; used for sailing from New England to Gulf
ship	American	deep water bulk carrier	sails; 3-5 masts		5 masts and steel hulls in late 1800s to early 1900s
skiff	American		sails; rowed	12-24' long	used in inshore waters; open or partly decked
skipjack	American		cat, lug sails; sloop rigged	20-25' long	developed in Rhode Island/Massachusetts ca. 1860, built on Gulf ca. 1886
sloop	American	fishing; freight	sails; 1 mast		in late 1800s, often used as yachts
smack (=well smack)	American	fishing	sloop or schooner rigged	various	has a live-well, or waterfilled tank
snow (=brig)	American		fore-&-aft sails; 2 masts		
steamer	American	passenger; towing; freight	steam	30-70' long	various types used from 1820s on river and bays of northern Gulf coast
steamboat, sidewheel paddle	American	riverine packet	high pressure steam engine driving two side paddles		common in mid-late 19th c. coastal trade
steamboat, sternwheel	American	riverine packet	high pressure steam engine driving sternwheel		supplanted sidewheel; used on bayous, canals, along coast
steamship, paddle	American	deep water cargo	low pressure steam engine		deep draft; iron and steel supplanted wood hulss in late 19th c.
well smack (=smack)	American	fishing	sloop or schooner rigged	various	has a live-well, or waterfilled tank
whitehall	American	harbor boat (for pilots, reporters, runner, brokers, etc.)	rowed	17-20' long	originated in New York in 1820s; used in Mobile

Rig	Origin	Purpose	Propulsion	Size (Approx.)	Notes
yawl	American	recreational since 1870s	rowed; fore-&-aft sails; 1-2 masts	15-23' long	
yawl-boat	American	gen. ship use, fishing, light freight from ca. 1850 to 1900	spirit, gaff sails; 1 mast	16-20' long	
1900-1980					
bark	American	deep water freight	square sails; 3-5 masts		deep water freighters used into 1920s
barkentine	American	freight	square sails; 3-6 masts	280' long	some built by Italian firm in Pascagoula
bay shrimper	American	shrimp, oysters	engine	35' long	inshore shrimper developed ca 1915 to 1925
bay steamers	American	ferry	sidewheeler engine		
Biloxi lugger	American	shrimp, oysters	engine	40' long	inshore vessels
Biloxi schooner	American	oyster dredging, deep water shrimping	engine	60-70' long	built on Mississippi coast until ca. 1933; nearly flat-bottomed
catboat	American	recreation, fishing	sails	24' long	
cat-rigged skiff	American	recreation, fishing	gaffor sprit sails; 1 mast	14' long	flat-bottomed; open
charter boat	American	sport fishing	engine	24-35' long	in use since ca. 1920; locally built were of wood; commercially built of fiberglass
crewboat	American	transport in offshore petroleum industry	engine		steel or aluminum monohull
dory	American	life boat	sails		
gulf shrimper	American	offshore shrimp trawler	engine	70-100' long	developed after 1937
Lafitte skiff	American	all-purpose, inshore, shallow water	engine	30-34' long	developed in Lafitte, Louisiana, between 1936 to 1946
mullet skiff	American	net fishing	outboard motor	16' long	commercially built, wooden, flat-bottomed
oyster skiff	American	oysters	outboard motor	18-25' long	flat-bottomed
snapper boat (=schooner)	American	offshore line fishing (deep water bottom or snapper fishing)	engine		schooners without sails and masts, refitted with engines
sport fisherman (=charter boat)	American				
steamship, screw propellor	American	deep water cargo	steam engine	350' long	supplanted paddle design; used through WWII
supplyboat, mudboat	American	serve offshore oil industry	diesel		design of Gulf origin
submarine, U-boat	German	warship	diesel		operated in Gulf from 1942 to 1944
tanker	various	petroleum	diesel		steamers began to carry petroleum in 1880s; became principal targets of U-boats
tugboat, towboat	American	tow boats, push boats	engine	55' long	early 20th c. tugs were narrow; later became barge towboats to push boats or dock vessels
whitehall	American		rowed		

east of Barataria Bay and its Pass, the Battle of Mobile Bay took place in 1864. It was one of the most important naval encounters in American history, marked by attendant defensive maritime works constructed by the Confederates. How many of these naval obstruction types may have been used in the defense of Fort Livingston is not known, but when used, the types and technology would have been similar throughout the northern Gulf region where Confederate forces were in control (see Table 9 for types of Confederate obstructions used against Union naval forces at Mobile Bay).

Various kinds of sea-side obstructions were employed. The upper line of defense was made up of log piles, while the lower line consisted mainly of sunken ships held together with heavy cables and held in place by pilings. The ships had to be loaded sufficiently with heavy materials to keep them sunken and to keep them from moving. Von Sheliha recommended that ships should be filled with brick, brickbats, sand, burnt clay, and stone. Pig iron also was used (Von Sheliha 1868).

The other major obstruction used by Confederate engineers were piles, which were preferred over all other kinds of obstructions. Piles were driven closely together (perhaps a hundred or more) in rows. Braces connected the piers to each other. In between the rows, long and heavy logs floated making up booms attached to the piers of logs with heavy chains. In most cases, the piles generally were constructed of yellow pine, bark left on, with a diameter of from twelve to fifteen inches, and with a length dependant on the depth of the water (Von Sheliha 1868). Other obstructions included floating mines (called torpedoes), and construction of heavy batteries to guard the torpedoes. These techniques proved relatively successful in keeping Union vessels from navigable waters and forcing them into shoals and shallows.

The physical geographic situation at Barataria Pass is similar to that found at Mobile Bay. Although Fort Livingston was occupied by Confederate forces, it is not known if similar maritime obstructive tactics were employed at the pass between Grande Isle and Grand Terre Island.

World War II

The German submarine operated in Gulf of Mexico from 1942-1944, and the tanker vessel was their main target in the Gulf of Mexico during World War II (Rohwer 1983). The research for this report did not identify any Allied shipping sunk by U-Boats or U-Boats sunk by the Allies in the immediate vicinity of the project area in Barataria Pass. Wrecked military vessels were recorded in the Gulf as early as the 1910s. Figure 26 shows wrecks within approximately 60 miles of Barataria Pass and the project area. The vessels reported wrecked in this area are: *Virginia*, *Benjamin Brewster*, *David McKelvy*, *R.M. Parker*, *R.W. Gallagher*, *Heredia*, *Castine*, *Bayard*, and an unnamed wreck. Table 6 provides a complete listing of vessels found wrecked in the area of the Gulf adjacent to Barataria Pass and the project area.

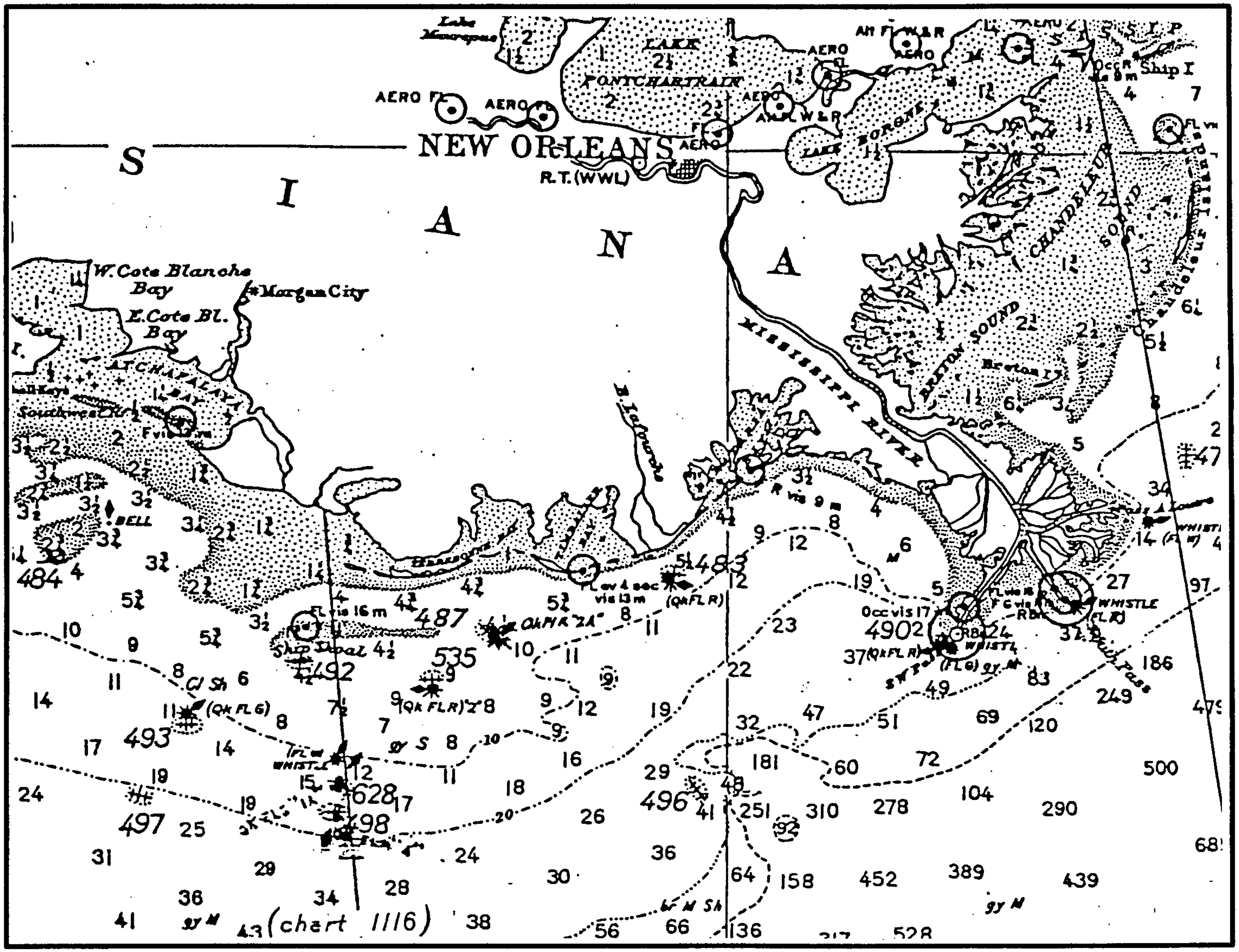


Figure 26. Excerpt from U.S. Coast and Geodetic Survey 1942 *Gulf of Mexico* nautical chart (no. 1007-A) displaying military wrecks to the southwest and southeast of Barataria Pass

CHAPTER VII

SURVEY RESULTS

The following discussion presents the results of the Phase I archeological remote sensing for the Barataria Pass ODMDS Project. A general overview is provided, followed by a description of the area and the targets located in the survey area. Figures 27 and 28 show the spatial distribution of magnetic and acoustic anomalies. As noted in the previous chapter, anomalies were identified initially from individual trackline data sets. After clustering anomalies into groups, magnetic contours were produced and analyzed for those targets that may be impacted by the Barataria Pass ODMDS Project.

General Overview of the Survey Results

A total of 163 magnetic anomalies were detected during the Barataria Pass ODMDS remote sensing survey. Individual magnetic anomalies are quantified in Table 11. A total of 17 acoustic anomalies also were recorded during the survey (Table 12). Twenty-five total target clusters were defined for this survey; seven targets produced acoustic anomalies corresponding with magnetic data (Table 13) (Figures 29 and 30). Two individual acoustic anomalies also are considered targets.

In the section following, seventeen of the twenty-five targets are described; these comprised the only targets that represent good signatures for possible cultural resources. An assessment of each target's potential for representing a significant submerged cultural resource is presented, and management recommendations for these potential resources are provided. As will be seen, only two of the 25 targets have been recommended for further study in lieu of avoidance (Targets 6 and 19). Targets 6 and 19 likely represent scattered material from known shipwrecks because of their high magnetic signatures and locations near known wrecks.

The bank area of the survey consisted of beaches that had a scatter of debris, which consisted of metal tanks and drums associated with the petroleum industry. There were also areas that had crib work and dock structures. The northwestern end of the survey ran into a large shallow area with a sand bar. Survey lines into this area had to be terminated early, due to the shallowness of the water. A cluster of anomalies, however, was located on adjacent lines to the west of the shoal area.

The Targets

Target #1

Target #1 consists of three magnetic disturbances (M93, M96, and M99). These disturbances have low to medium magnetic signatures; however, they have long durations, such as half a minute long (Figure 31). These disturbances are not typical of significant cultural resources or a shipwreck. This target probably represents modern ferrous debris scattered over a large area. No further study of this target is recommended.

Target #3

This target consists of three correlating anomalies: two magnetic disturbances (M108 and M117), and one acoustic anomaly (A16). M108 represents a multi-component signature of low amplitude, but of long duration. M117

Table 11. Inventory of Magnetic Anomalies in Barataria Pass ODMDS Survey Area

Anom#	Line	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y	Correlations (with Sonar)
M1	1	13:34:01	13:33:50	7.00	-	0:00:11	3731298.10	281090.50	
M2	1	13:26:20	13:26:09	57.50	D	0:00:11	3733463.60	279183.60	
M3	1	13:21:24	13:21:13	18.00	-	0:00:12	3734820.40	277997.30	
M4	1	13:11:41	13:10:54	256	MC	0:00:47	3737558.50	275585.80	A1
M5	1	13:03:49	13:03:21	20	D	0:00:28	3739690.50	273752.00	
M6	1	12:55:43	12:55:24	26	-	0:00:20	3741910.60	271752.80	
M7	2	13:54:49	13:54:44	17	-	0:00:05	3727568.70	284246.20	
M8	2	13:55:14	13:55:05	24	D	0:00:08	3727687.30	284148.40	
M9	2	14:15:57	14:15:50	6.5	+	0:00:08	3733478.50	279031.90	
M10	2	14:31:15	14:31:00	33	+	0:00:15	3737224.00	275741.30	
M11	2	14:41:24	14:41:02	13.5	D	0:00:22	3739679.30	273585.00	
M12	2	14:41:59	14:41:31	15.5	D	0:00:28	3739820.50	273470.80	
M13	3	15:40:31	15:37:43	9	+	0:02:48	3729147.80	282693.80	
M14	3	15:36:33	15:33:07	6.5	+	0:03:26	3730334.60	281684.20	
M15	3	15:24:12	15:24:02	16	D	0:00:10	3733408.60	278975.80	
M16	3	15:16:02	15:15:51	16	+	0:00:11	3735772.80	276884.20	
M17	3	15:08:32	15:08:21	8.5	D	0:00:11	3737960.30	274947.90	
M18	3	15:08:00	15:07:53	6	+	0:00:07	3738100.00	274822.20	
M19	3	15:04:28	15:03:48	6	+	0:00:40	3739206.30	273878.70	
M20	3	15:02:26	15:02:11	8.5	+	0:00:15	3739722.20	273425.10	
M21	3	14:57:54	14:57:30	5.5	-	0:00:25	3741002.10	272277.10	
M22	4	15:52:43	15:52:38	40	D	0:00:06	3727826.70	283770.20	
M23	4	16:01:34	16:01:27	33.5	-	0:00:08	3730141.40	281700.40	
M24	4	16:37:05	16:36:50	27.5	D	0:00:15	3739472.30	273492.50	
M25	4	16:42:59	16:42:41	14	-	0:00:18	3741119.00	272050.30	
M26	5	17:08:35	17:08:18	1095.5	-	0:00:17	3737188.00	275372.30	
M27	5	16:57:48	16:57:30	18.5	D	0:00:18	3740428.10	272522.30	
M28	6	10:18:22	10:18:00	21.5	+	0:00:22	3741027.50	271860.50	
M29	6	10:31:28	10:31:15	9.5	D	0:00:13	3737738.70	274751.40	
M30	7	11:31:23	11:31:12	20	-	0:00:12	3731343.00	280251.80	
M31	7	11:55:36	11:55:25	11.5	-	0:00:11	3736858.80	275382.40	
M32	7	12:05:06	12:04:47	12.5	D	0:00:19	3739140.30	273374.90	
M33	7	12:06:45	12:06:19	14.5	D	0:00:25	3739542.30	273023.00	
M34	7	12:12:50	12:12:31	24.5	D	0:00:19	3740965.50	271784.70	
M35	8	12:27:29	12:27:05	7	+	0:00:25	3740743.00	271844.30	
M36	8	12:32:22	12:31:32	40	MC	0:00:50	3739296.30	273116.00	
M37	8	12:36:05	12:35:46	32.5	D	0:00:20	3738242.70	274036.00	
M38	8	12:40:23	12:40:07	11.5	-	0:00:16	3737018.40	275128.60	
M39	8	13:06:35	13:06:27	66	-	0:00:08	3729345.20	281892.20	
M40	8	13:14:52	13:14:47	81.5	-	0:00:05	3727024.10	283918.80	
M41	9	13:24:59	13:24:48	540	D	0:00:11	3728298.20	282669.20	
M42	10	14:24:11	14:23:52	9.5	-	0:00:19	3740077.10	272160.50	
M43	10	14:27:27	14:26:58	11	+	0:00:30	3739172.50	272955.50	
M44	10	14:52:27	14:52:20	11.5	+	0:00:07	3731945.40	279294.50	
M45	11	15:15:36	15:15:26	38	D	0:00:11	3726822.40	283731.60	
M46	11	15:19:57	15:19:45	268.5	D	0:00:12	3727843.40	282834.60	
M47	11	15:28:46	15:28:33	50.5	-	0:00:14	3729944.00	280965.80	

Anom#	Line	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y	Correlations (with Sonar)
M48	11	15:51:55	15:51:46	97.5	+	0:00:09	3735470.60	276092.90	
M49	11	16:05:32	16:05:01	17.5	D	0:00:31	3738851.60	273112.90	
M50	12	17:04:01	17:03:56	24	+	0:00:05	3728586.10	282033.00	
M51	12	17:00:10	17:00:03	32	D	0:00:07	3729613.20	281129.80	
M52	12	16:59:17	16:59:06	129.5	-	0:00:11	3729843.50	280887.80	
M53	12	16:53:33	16:53:22	26	D	0:00:11	3731462.30	279494.40	A9, A10
M54	12	16:34:07	16:33:54	19.5	-	0:00:12	3737060.70	274556.90	
M55	12	16:31:32	16:31:24	13.5	+	0:00:09	3737809.00	273896.70	
M56	13	17:15:56	17:15:51	129	+	0:00:05	3726712.80	283536.80	
M57	13	17:19:42	17:19:34	32.5	+	0:00:08	3727613.50	282750.70	
M58	13	17:29:32	17:29:22	22	+	0:00:10	3730089.30	280550.30	
M59	14	10:47:03	10:46:50	47	+	0:00:13	3734996.60	276083.20	
M60	14	10:38:38	10:38:20	20.5	+	0:00:18	3737395.70	273974.00	
M61	14	10:34:40	10:34:23	89.5	-	0:00:17	3738513.30	272977.40	
M62	14	10:34:04	10:33:03	137	MC	0:01:01	3738781.00	272775.00	
M63	15	11:36:08	11:36:00	10	-	0:00:08	3729563.50	280773.30	
M64	15	11:44:50	11:44:38	73	D	0:00:12	3732173.70	278471.20	
M65	15	11:55:39	11:55:04	404	MC	0:00:35	3735222.50	275769.20	
M66	15	12:06:09	12:05:51	33.5	+	0:00:19	3738139.80	273187.10	
M67	15	12:15:17	12:14:57	12.5	-	0:00:20	3740708.10	270939.30	
M68	16	12:51:00	12:50:46	49	+	0:00:15	3732089.80	278397.40	
M69	16	12:50:18	12:50:01	74	D	0:00:17	3732314.30	278224.10	
M70	16	12:45:56	12:45:47	21.5	D	0:00:10	3733583.50	277077.90	
M71	16	12:27:13	12:26:50	24.5	+	0:00:22	3739168.50	272145.30	
M72	17	13:33:04	13:32:52	45	+	0:00:12	3734471.10	276149.10	
M73	17	13:38:17	13:38:06	9	D	0:00:11	3735883.20	274925.40	
M74	17	13:41:09	13:40:45	15.5	+	0:00:24	3736636.30	274258.70	
M75	17	13:55:29	13:55:10	89.5	D	0:00:19	3740543.50	270809.90	
M76	18	14:39:43	14:39:38	13	-	0:00:05	3729505.50	280398.00	
M77	18	14:36:24	14:36:13	73.5	D	0:00:11	3730576.80	279481.30	
M78	18	14:25:44	14:25:34	8.5	+	0:00:10	3733754.50	276666.60	
M79	18	14:25:06	14:24:19	30	MC	0:00:47	3734051.30	276396.10	
M80	18	14:11:05	14:10:42	19.5	+	0:00:23	3738077.00	272851.80	A13
M81	18	14:10:22	14:10:03	9	-	0:00:19	3738328.20	272650.30	
M82	18	14:08:26	14:08:00	29	D	0:00:26	3738902.20	272134.50	
M83	18	14:06:41	14:06:24	27	+	0:00:17	3739379.70	271699.10	A14, A15
M84	18	14:02:44	14:02:19	10	D	0:00:25	3740485.50	270700.20	
M85	19	14:54:46	14:54:00	11	-	0:00:46	3728899.90	280822.20	
M86	19	15:00:57	15:00:48	30	+	0:00:09	3730599.70	279307.60	
M87	19	15:11:17	15:11:02	71.5	-	0:00:15	3733335.10	276916.50	
M88	19	15:20:17	15:19:48	22.5	D	0:00:29	3735780.00	274729.30	
M89	20	16:08:10	16:07:59	51	D	0:00:12	3732632.90	277388.10	
M90	20	16:06:47	16:06:38	37	-	0:00:09	3733083.50	277000.50	
M91	20	15:56:46	15:56:10	12	MC	0:00:36	3736258.80	274180.40	
M92	20	15:55:15	15:55:00	73	D	0:00:15	3736678.50	273833.20	
M93	20	15:41:49	15:41:10	35.5	-	0:00:39	3740578.00	270382.70	
M94	21	16:30:03	16:29:50	43	-	0:00:13	3729238.40	280310.80	
M95	21	16:53:03	16:52:49	15	-	0:00:13	3735021.50	275152.90	
M96	21	17:13:19	17:12:44	40	D	0:00:36	3740436.20	270361.60	

Anom#	Line	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y	Correlations (with Sonar)
M97	22	18:00:10	17:59:58	19.5	D	0:00:13	3727633.30	281509.70	
M98	22	17:39:22	17:38:46	112	D	0:00:35	3734385.80	275585.90	
M99	22	17:19:01	17:18:38	65.5	+	0:00:23	3740331.70	270336.00	
M100	23	11:53:36	11:53:12	27	D	0:00:24	3727648.70	281378.90	
M101	23	11:44:00	11:43:40	9	-	0:00:20	3729788.10	279500.70	
M102	23	11:40:31	11:40:22	17	+	0:00:09	3730524.30	278849.40	
M103	23	11:37:30	11:37:19	14	D	0:00:11	3731216.90	278234.00	
M104	23	11:32:32	11:32:13	18.5	-	0:00:19	3732372.40	277235.60	
M105	23	11:24:46	11:24:36	21.5	+	0:00:10	3734222.00	275579.40	
M106	23	11:23:52	11:23:40	14	+	0:00:12	3734458.20	275393.80	
M107	23	11:11:21	11:11:06	66	-	0:00:14	3737628.50	272579.70	
M108	23	11:04:06	11:03:15	22.5	MC	0:00:51	3739577.50	270851.90	A16
M109	24	12:11:37	12:11:29	180.5	+	0:00:08	3727576.10	281320.80	
M110	24	12:33:14	12:33:05	18	-	0:00:09	3733509.30	276086.70	
M111	24	12:34:59	12:34:46	72	D	0:00:13	3733944.50	275677.20	
M112	24	12:35:46	12:35:38	19	+	0:00:08	3734165.40	275509.70	
M113	24	12:36:09	12:36:02	18.5	-	0:00:07	3734259.70	275421.90	
M114	24	12:42:05	12:41:29	31	+	0:00:36	3735642.00	274195.70	
M115	24	12:50:47	12:50:12	17	MC	0:00:35	3737564.90	272469.80	
M116	24	12:53:05	12:52:40	18	D	0:00:25	3738071.70	272064.70	
M117	24	12:59:53	12:59:26	104.5	+	0:00:26	3739582.50	270743.90	A16
M118	25	13:57:40	13:57:28	39	D	0:00:12	3726365.50	282197.10	
M119	25	13:55:45	13:55:13	53	D	0:00:31	3726985.40	281719.10	
M120	25	13:51:30	13:51:20	26	D	0:00:10	3728137.60	280668.30	
M121	25	13:42:20	13:42:06	27.5	-	0:00:13	3730645.30	278493.20	
M122	25	13:39:58	13:39:36	112	-	0:00:21	3731230.10	277964.80	
M123	25	13:37:53	13:37:40	23	D	0:00:13	3731755.30	277503.50	
M124	25	13:37:22	13:37:12	26	+	0:00:09	3731882.90	277383.50	
M125	25	13:31:07	13:31:00	22.5	-	0:00:08	3733493.30	275973.90	
M126	25	13:28:53	13:28:39	61.5	-	0:00:13	3734090.00	275432.80	
M127	25	13:23:56	13:23:39	47	-	0:00:17	3735541.90	274153.20	
M128	25	13:21:34	13:20:59	168	MC	0:00:35	3736286.00	273495.10	
M129	26	14:13:18	14:12:53	340.5	D	0:00:25	3726902.00	281658.40	
M130	26	14:22:59	14:22:35	29.5	-	0:00:25	3729905.80	279003.70	
M131	26	14:35:26	14:35:00	160	D	0:00:26	3733859.50	275502.50	
M132	26	14:37:12	14:36:43	93	MC	0:00:30	3734375.80	275053.80	
M133	26	14:39:49	14:39:35	44.5	+	0:00:14	3735175.90	274357.20	
M134	26	14:41:39	14:40:44	131	MC	0:00:55	3735613.30	273958.50	
M135	27	15:45:21	15:45:12	19	+	0:00:09	3726819.20	281585.50	
M136	27	15:37:06	15:36:51	19.5	+	0:00:15	3729773.70	278972.70	
M137	27	15:36:17	15:36:02	26	D	0:00:15	3730103.00	278684.10	
M138	27	15:32:51	15:32:41	65.5	-	0:00:10	3731274.30	277668.00	
M139	27	15:30:32	15:30:21	61	-	0:00:11	3732061.90	276945.30	
M140	27	15:26:09	15:25:16	127	MC	0:00:53	3733246.80	275922.20	
M141	27	15:27:06	15:26:51	85	D	0:00:15	3733664.10	275564.10	
M142	27	15:22:35	15:22:27	33.5	+	0:00:08	3734728.80	274597.50	
M143	27	15:16:56	15:16:43	21	-	0:00:13	3736593.60	272953.50	
M144	28	15:55:43	15:55:35	17	-	0:00:08	3726224.70	282000.50	
M145	28	15:56:00	15:55:48	15	D	0:00:12	3726305.00	281934.20	

Anom#	Line	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y	Correlations (with Sonar)
M146	28	16:14:58	16:14:37	66.5	MC	0:00:21	3731361.90	277447.70	
M147	28	16:20:39	16:20:31	77	D	0:00:08	3733007.70	276019.50	
M148	28	16:21:56	16:21:37	390.5	D	0:00:19	3733323.10	275704.60	
M149	28	16:24:15	16:23:51	20.5	+	0:00:24	3733958.00	275149.00	
M150	28	16:25:53	16:24:50	68	MC	0:01:03	3734408.70	274760.20	
M151	28	16:29:30	16:29:06	116.5	+	0:00:24	3735526.70	273765.70	
M152	28	16:50:05	16:49:43	47	D	0:00:22	3739482.50	270271.70	
M153	29	17:44:05	17:43:53	328.5	D	0:00:13	3725842.60	282174.90	
M154	29	17:43:26	17:43:09	924	D	0:00:17	3726035.20	281977.90	
M155	29	17:34:43	17:34:22	69	D	0:00:21	3729055.00	279343.20	
M156	29	17:32:38	17:32:24	77	+	0:00:15	3729721.40	278767.50	
M158	29	17:30:51	17:30:42	22	-	0:00:10	3730296.40	278265.80	
M159	29	17:25:04	17:24:48	68	-	0:00:16	3732090.70	276669.50	
M160	29	17:22:48	17:21:00	63	MC	0:01:49	3732918.60	275940.70	
M161	29	17:17:12	17:17:11	19	D	0:00:01	3734439.10	274602.30	
M162	29	17:16:05	17:15:50	54.5	-	0:00:15	3734781.70	274291.30	
M163	29	17:13:44	17:13:21	44.5	D	0:00:23	3735475.20	273678.60	

Table 12. Inventory of Acoustic Anomalies in Barataria Pass ODMDS Survey Area

Anomaly No.	Line No.	Disk No.	Disk %	Date	Time	X	Y	Offset	Description	Correlation
A1	1	1	37%	11/21/99	13:11:03 13:11:11	3737422.57	275703.54	97.5 ft port	Archaute anomaly	M4
A2	1	1	40%	11/21/99	13:26:40 13:26:52	3733144.74	279468.97	38 ft - 64ft, 76ft port	Linear anomaly	
A3	2	1	44%	11/21/99	14:27:14 14:27:57	3736505.28	276370.96	71 ft - 98 ft port	Wide archaute anomaly	
A4	2	1	46%	11/21/99	14:39:24 14:39:34	3739439.34	273837.66	23.2 ft port	Possible pilings	
A5	4	1	56%	11/21/99	16:44:59 16:50:29	3741509.65	271536.15	16.3 ft stbd	Linear anomaly	
A6	6	1	61%	11/22/99	10:15:11 10:15:40	3741666.47	271325.98	11.9 ft stbd	Linear anomaly	
A7	7	1	66%	11/22/99	11:10:36- 11:10:42	3726775.35	284421.55	13.2 ft stbd	Debris	
A8	11	2	15%	11/22/99	15:12:36 15:12:14	3726337.95	284119.21	13.5 ft stbd	Rectilinear anomaly	
A9	12	2	24%	11/22/99	16:52:33 16:52:40	3731529.59	279418.70	30 ft port / 30 ft stbd	Rectilinear debris field that crosses boat track	M53
A10	13	2	28%	11/22/99	17:34:29 17:34:32	3731503.92	279345.65	13.5 ft stbd/ 20 ft port	linear anomaly that crosses boat track	M53
A11	15	2	40%	11/23/99	12:16:04 12:16:18	3741107.34	270555.20	27.6 ft - 55.7 ft stbd	Possible ship wreck w/ drag scaring	
A12	17	2	47%	11/23/99	13:43:03 13:43:19	3737422.80	273557.84	35.1 ft port	Oblong anomaly	
A13	18	2	49%	11/24/99	14:10:50 14:10:57	3737940.48	272970.30	9.6 ft - 58.8 ft port	Rectilinear anomaly, possible debris field	M80
A14	19	2	56%	11/24/99	15:31:54 15:32:11	3739382.58	271582.13	32.4 ft - 84.8 ft port	4 cluster of debris	M83
A15	20	2	57%	11/24/99	15:45:25 15:45:40	3739260.33	271580.60	50 ft - 82.2 ft port	Rectilinear anomaly	M83
A16	23	2	69%	11/25/99	11:03:06	3739647.54	270803.55	71.6 ft port	Linear anomaly	M108, M117
A17	25	3	12%	11/25/99	13:48:15 13:48:30	3728848.50	280040:35	25ft - 82 ftport	Possible ship	

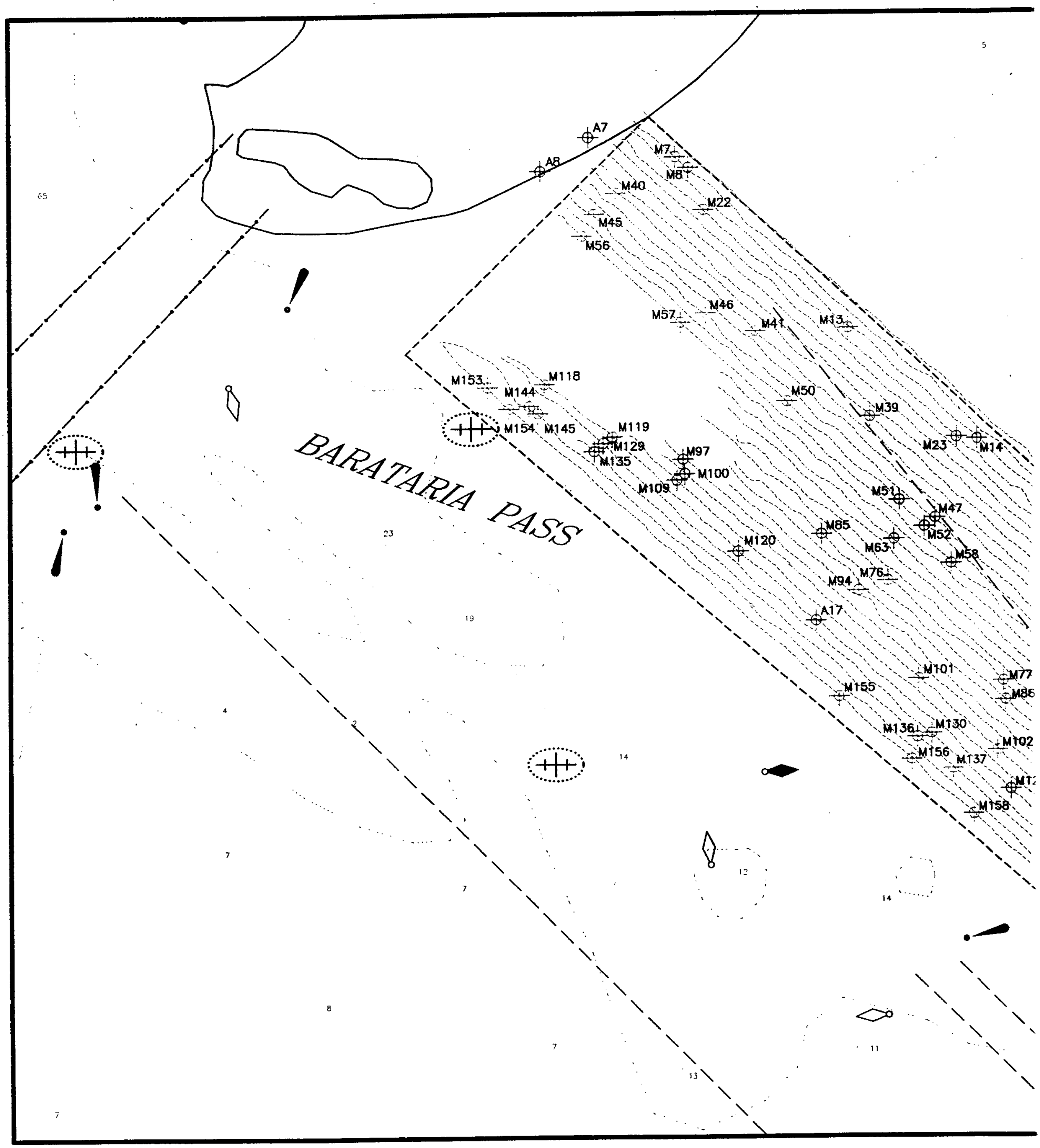
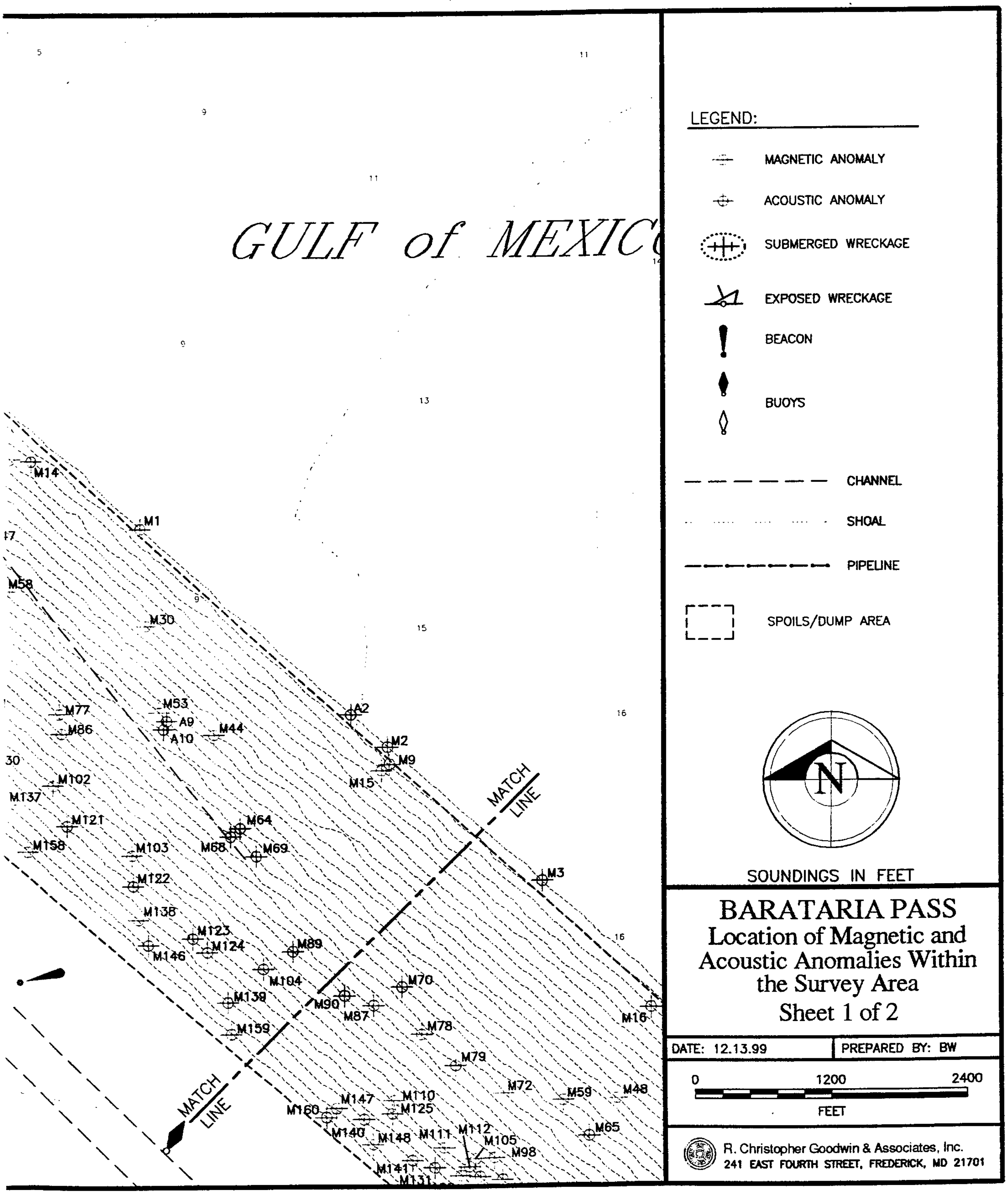


Figure 27. Location of Anomalies within the Survey Area – Sheet 1 of 2

(1)


GULF of MEXICO
LEGEND:
MAGNETIC ANOMALY
ACOUSTIC ANOMALY
SUBMERGED WRECKAGE
EXPOSED WRECKAGE
BEACON
BUOYS
CHANNEL
SHOAL
PIPELINE
SPOILS/DUMP AREA
N
SOUNDINGS IN FEET
BARATARIA PASS
Location of Magnetic and Acoustic Anomalies Within the Survey Area
Sheet 1 of 2
DATE: 12.13.99
PREPARED BY: BW
0
1200
2400
FEET
R. Christopher Goodwin & Associates, Inc.
241 EAST FOURTH STREET, FREDERICK, MD 21701
MATCH LINE
MATCH LINE
M14
M1
M58
M30
M77
M86
M53
A9
A10
M44
A2
M2
M9
M15
M102
M137
M121
M64
M158
M103
M68
M69
M122
M3
M138
M123
M124
M89
M146
M104
M70
M139
M90
M87
M16
M159
M78
M79
M72
M59
M48
M147
M110
M160
M125
M140
M148
M111
M112
M105
M65
M98
M141
M131

(2.)

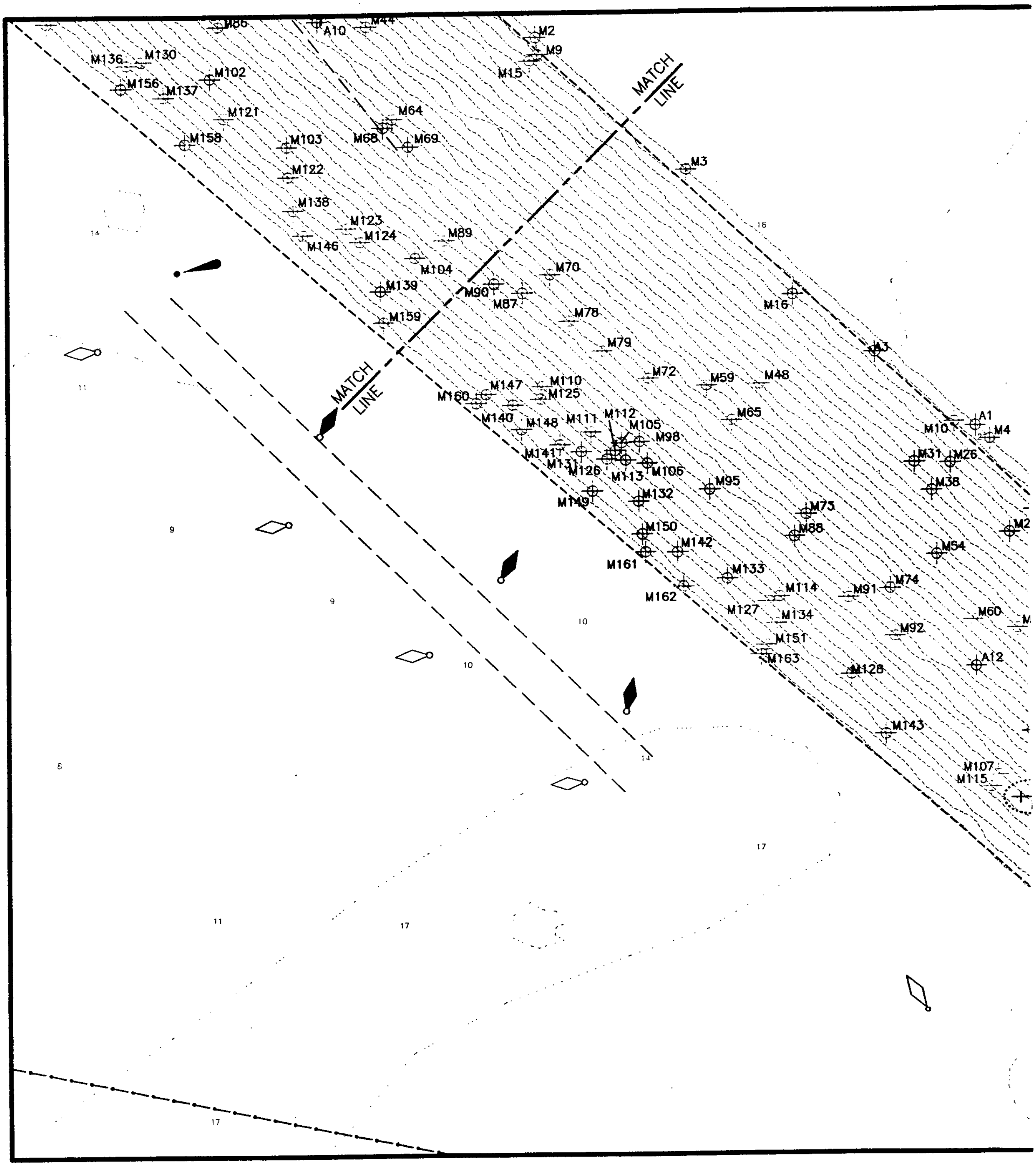


Figure 28. Location of Anomalies within the Survey Area – Sheet 2 of 2

(1)

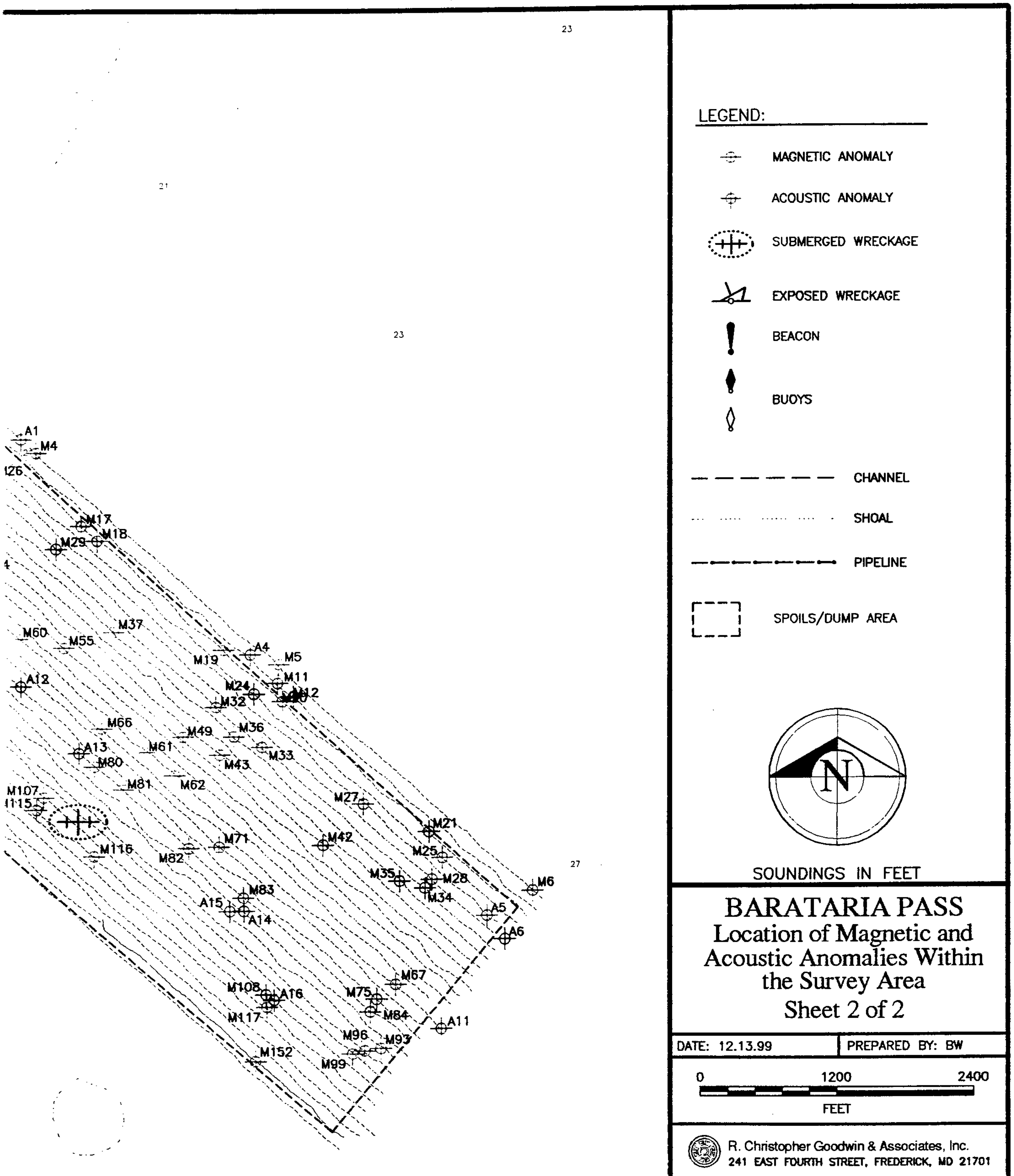

LEGEND:
MAGNETIC ANOMALY
ACOUSTIC ANOMALY
SUBMERGED WRECKAGE
EXPOSED WRECKAGE
BEACON
BUOYS
CHANNEL
SHOAL
PIPELINE
SPOILS/DUMP AREA
N
SOUNDINGS IN FEET
BARATARIA PASS
Location of Magnetic and Acoustic Anomalies Within the Survey Area
Sheet 2 of 2
DATE: 12.13.99
PREPARED BY: BW
0
1200
2400
FEET
R. Christopher Goodwin & Associates, Inc.
241 EAST FOURTH STREET, FREDERICK, MD 21701
A1
M4
M17
M29
M18
M60
M55
M37
M19
A4
M5
M11
A12
M24
M32
M12
M66
M49
M36
A13
M61
M33
M80
M43
M81
M62
M107
M27
M21
M116
M71
M42
M82
M25
M35
M28
M6
M34
M83
A15
A14
A5
A6
M67
M108
A16
M75
M84
M117
A11
M96
M93
M152
M99
23
21
23
27

Table 13. Inventory of Target Clusters

Anom #	Line #	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y
Target 1								
M93	20	15:41:49	15:41:10	35.5	-	0:00:39	3740578.00	270382.70
M96	21	17:13:19	17:12:44	40	D	0:00:36	3740436.20	270361.60
M99	22	17:19:01	17:18:38	65.5	+	0:00:23	3740331.70	270336.00
Target 2								
M75	17	13:55:29	13:55:10	89.5	D	0:00:19	3740543.50	270809.90
M84	18	14:02:44	14:02:19	10	D	0:00:25	3740485.50	270700.20
Target 3								
M108	23	11:04:06	11:03:15	22.5	MC	0:00:51	3739577.50	270851.90
M117	24	12:59:53	12:59:26	104.5	+	0:00:26	3739582.50	270743.90
A16	23	11:03:06					3739647.54	270803.55
Target 4								
M12	2	14:41:59	14:41:31	15.5	D	0:00:28	3739820.50	273470.80
M120	25	13:51:30	13:51:20	26	D	0:00:10	3728137.60	280668.30
Target 5								
M28	6	10:18:22	10:18:00	21.5	+	0:00:22	3741027.50	271860.50
M34	7	12:12:50	12:12:31	24.5	D	0:00:19	3740965.50	271784.70
Target 6		shipwreck near by						
M107	23	11:11:21	11:11:06	66	-	0:00:14	3737628.50	272579.70
M115	24	12:50:47	12:50:12	17	MC	0:00:35	3737564.90	272469.80
Target 7								
M151	28	16:29:30	16:29:06	116.5	+	0:00:24	3735526.70	273765.70
M163	29	17:13:44	17:13:21	44.5	D	0:00:23	3735475.20	273678.60
Target 8								
M114	24	12:42:05	12:41:29	31	+	0:00:36	3735642.00	274195.70
M127	25	13:23:56	13:23:39	47	-	0:00:17	3735541.90	274153.20
Target 9								
M98	22	17:39:22	17:38:46	112	D	0:00:35	3734385.80	275585.90
M105	23	11:24:46	11:24:36	21.5	+	0:00:10	3734222.00	275579.40
M112	24	12:35:46	12:35:38	19	+	0:00:08	3734165.40	275509.70
M113	24	12:36:09	12:36:02	18.5	-	0:00:07	3734259.70	275421.90
M126	25	13:28:53	13:28:39	61.5	-	0:00:13	3734090.00	275432.80
Target 10								
M110	24	12:33:14	12:33:05	18	-	0:00:09	3733509.30	276086.70
M125	25	13:31:07	13:31:00	22.5	-	0:00:08	3733493.30	275973.90
Target 11								
M147	28	16:20:39	16:20:31	77	D	0:00:08	3733007.70	276019.50
M160	29	17:22:48	17:21:00	63	MC	0:01:49	3732918.60	275940.70
Target 12								
M2	1	13:26:20	13:26:09	57.50	D	0:00:11	3733463.60	279183.60
M9	2	14:15:57	14:15:50	6.5	+	0:00:08	3733478.50	279031.90
M15	3	15:24:12	15:24:02	16	D	0:00:10	3733408.60	278975.80

Anom #	Line #	Event Time	Event Time	Gamma	Signature	Duration (seconds)	X	Y
Target 13								
M64	15	11:44:50	11:44:38	73	D	0:00:12	3732173.70	278471.20
M68	16	12:51:00	12:50:46	49	+	0:00:15	3732089.80	278397.40
Target 14								
M103	23	11:37:30	11:37:19	14	D	0:00:11	3731216.90	278234.00
M122	25	13:39:58	13:39:36	112	-	0:00:21	3731230.10	277964.80
M138	27	15:32:51	15:32:41	65.5	-	0:00:10	3731274.30	277668.00
M146	28	16:14:58	16:14:37	66.5	MC	0:00:21	3731361.90	277447.70
Target 15								
M130	26	14:22:59	14:22:35	29.5	-	0:00:25	3729905.80	279003.70
M136	27	15:37:06	15:36:51	19.5	+	0:00:15	3729773.70	278972.70
Target 16								
M47	11	15:28:46	15:28:33	50.5	-	0:00:14	3729944.00	280965.80
M52	12	16:59:17	16:59:06	129.5	-	0:00:11	3729843.50	280887.80
Target 17								
M97	22	18:00:10	17:59:58	19.5	D	0:00:13	3727633.30	281509.70
M100	23	11:53:36	11:53:12	27	D	0:00:24	3727648.70	281378.90
M109	24	12:11:37	12:11:29	180.5	+	0:00:08	3727576.10	281320.80
Target 18								
M119	25	13:55:45	13:55:13	53	D	0:00:31	3726985.40	281719.10
M129	26	14:13:18	14:12:53	340.5	D	0:00:25	3726902.00	281658.40
M135	27	15:45:21	15:45:12	19	+	0:00:09	3726819.20	281585.50
Target 19		shipwreck near by						
M144	28	15:55:43	15:55:35	17	-	0:00:08	3726224.70	282000.50
M145	28	15:56:00	15:55:48	15	D	0:00:12	3726305.00	281934.20
M154	29	17:43:26	17:43:09	924	D	0:00:17	3726035.20	281977.90
Target 20								
M83	18	14:06:41	14:06:24	27	+	0:00:17	3739379.70	271699.10
A14	19	15:31:54	15:32:11				3739382.58	271582.13
A15	20	15:45:25	15:45:40				3739260.33	271580.60
Ttarget 21								
M53	12	16:53:33	16:53:22	26	D	0:00:11	3731462.30	279494.40
A9	12	16:52:33	16:52:40				3731529.59	279418.70
A10	13	17:34:29	17:34:32				3731503.92	279345.65
Target 22								
M4	1	13:11:41	13:10:54	256	MC	0:00:47	3737558.50	275585.80
A1	1	13:11:03	13:11:11				3737422.57	275703.54
Target 23								
A17	25	13:48:15	13:48:30				3728848.50	280040.35
Target 24								
A11	15	12:16:04	12:16:18				3741107.34	270555.20
Target 25								
M80	18	14:11:05	14:10:42	19.5	+	0:00:23	3738077.00	272851.80
A13	18	14:10:50	14:10:57				3737940.48	272970.30

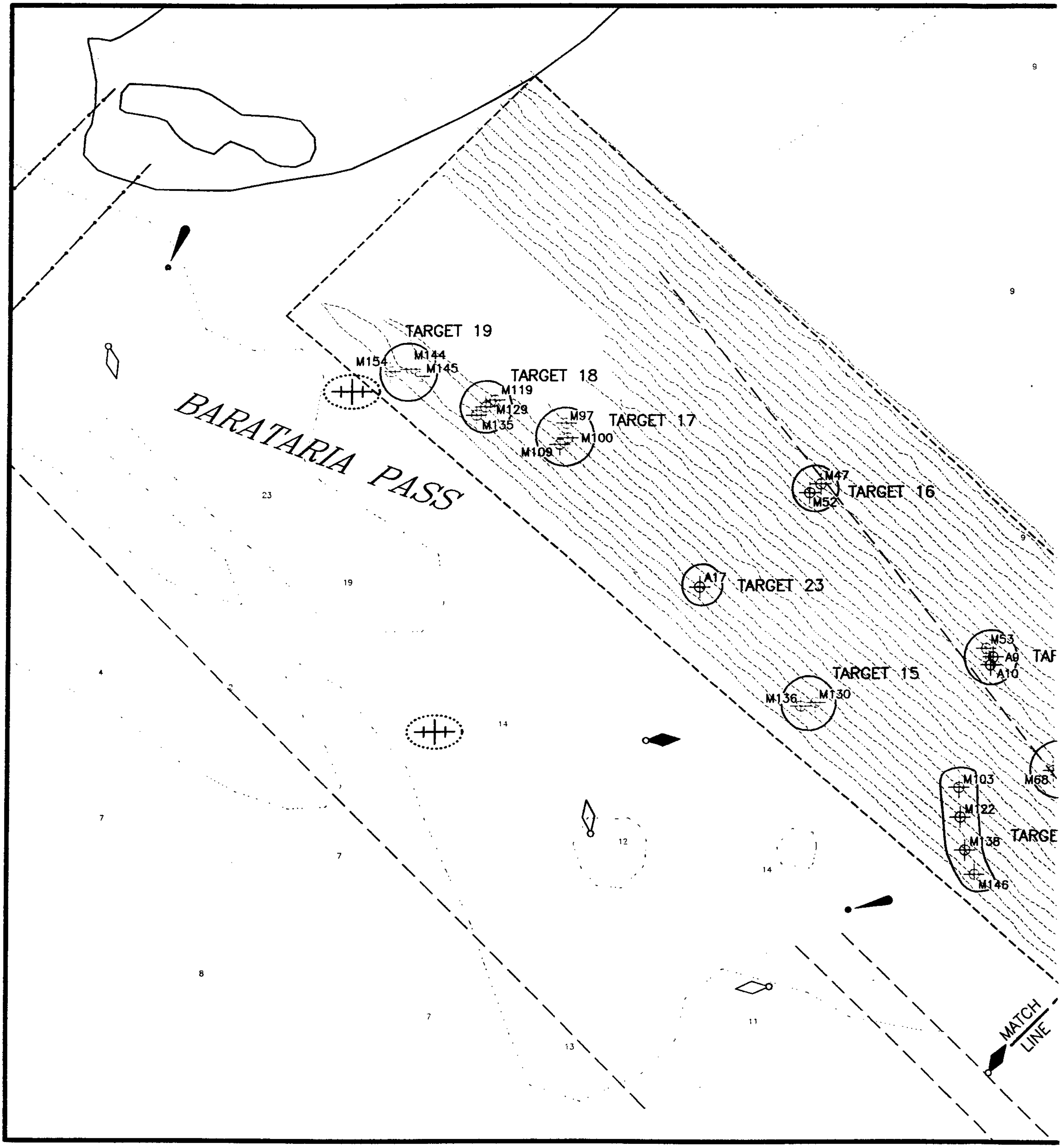
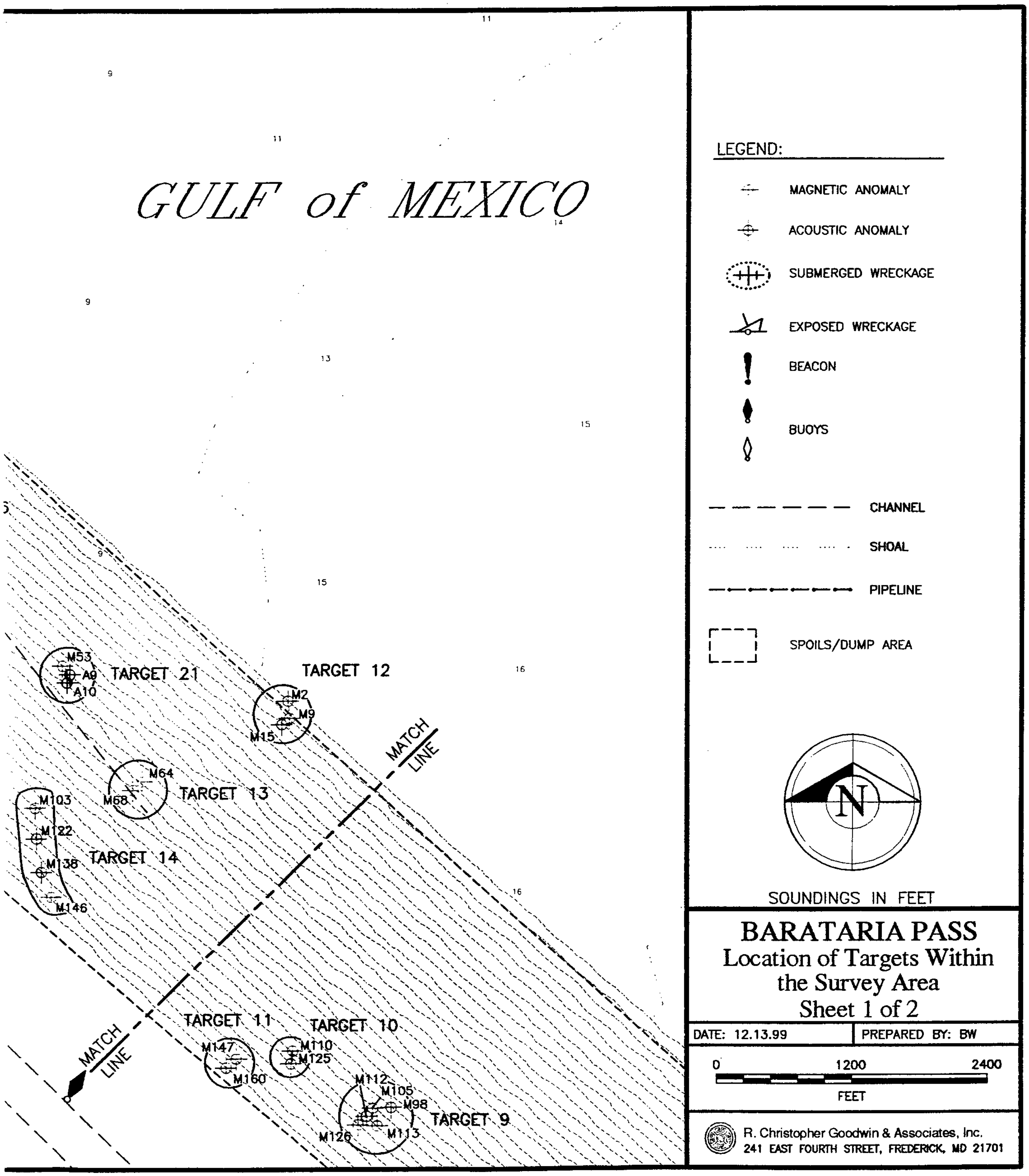


Figure 29. Location of Targets within the Survey Area – Sheet 1 of 2

(1)


GULF of MEXICO
TARGET 21
M53
A9
A10
TARGET 12
M2
M9
M15
TARGET 13
M64
M68
TARGET 14
M103
M122
M138
M146
MATCH LINE
TARGET 11
M147
M160
TARGET 10
M110
M125
TARGET 9
M112
M105
M98
M126
M113
LEGEND:
MAGNETIC ANOMALY
ACOUSTIC ANOMALY
SUBMERGED WRECKAGE
EXPOSED WRECKAGE
BEACON
BUOYS
CHANNEL
SHOAL
PIPELINE
SPOILS/DUMP AREA
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Location of Targets Within the Survey Area
Sheet 1 of 2
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241 EAST FOURTH STREET, FREDERICK, MD 21701

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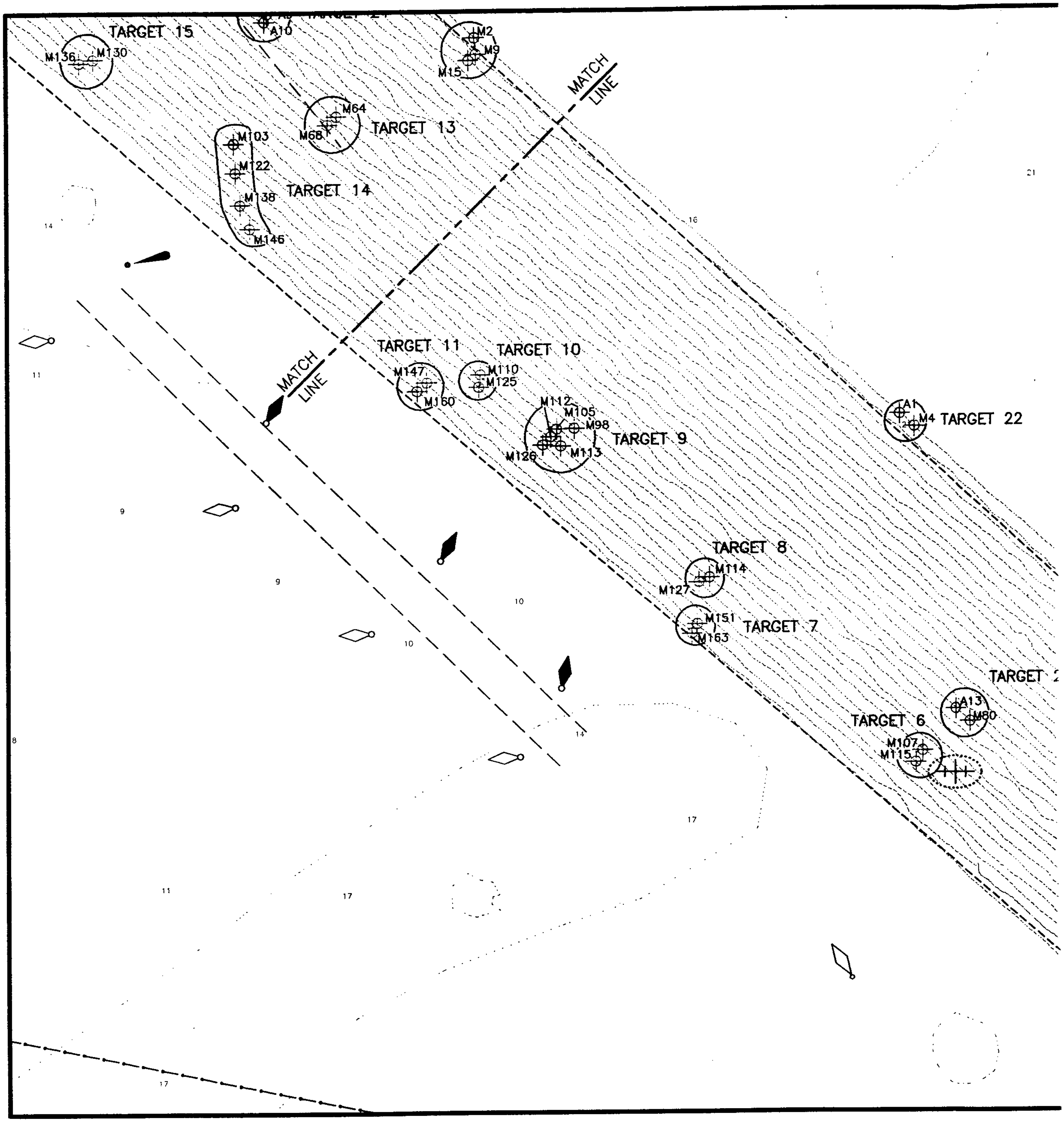
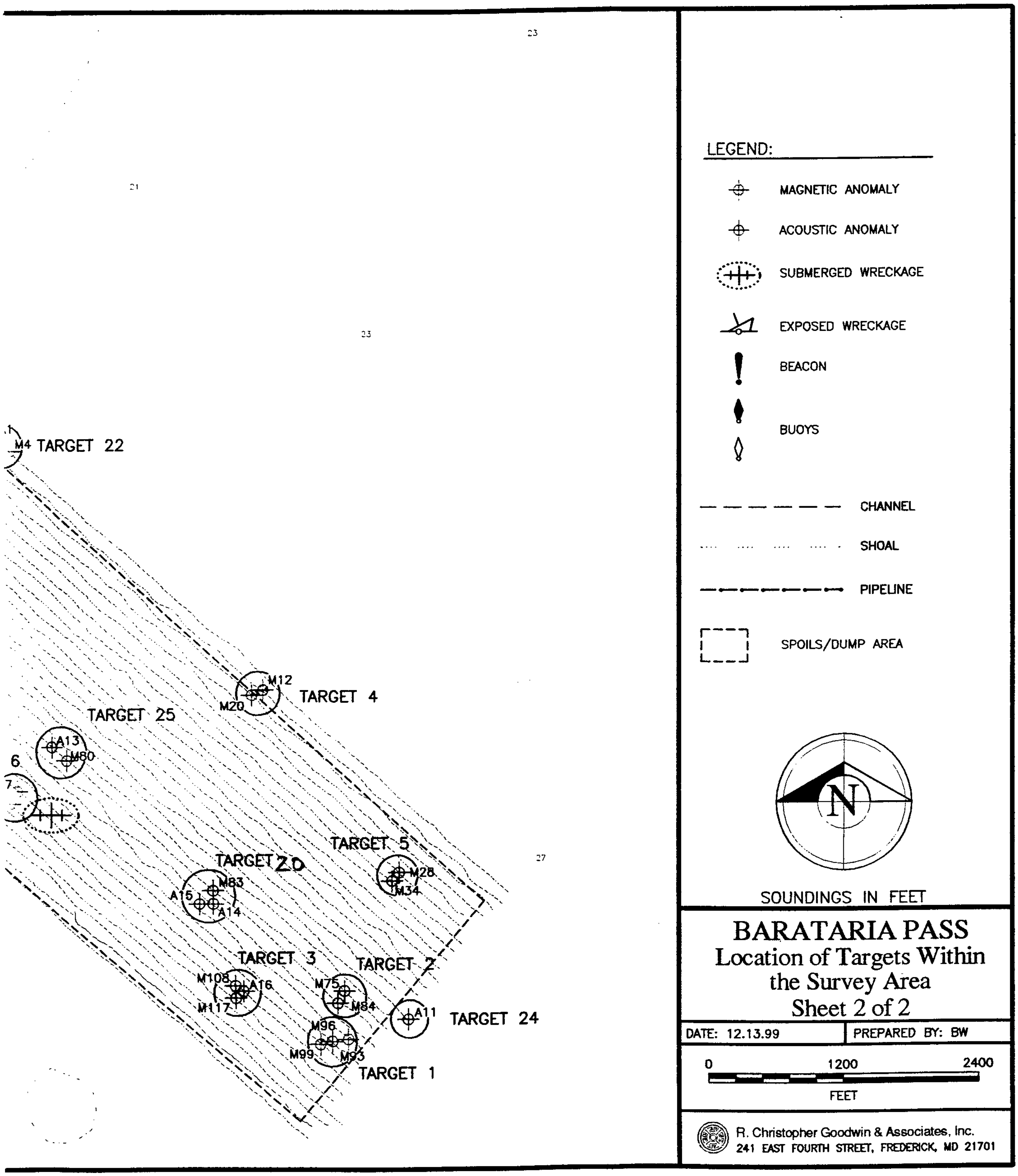


Figure 30. Location of Targets within the Survey Area – Sheet 2 of 2



M4 TARGET 22
TARGET 4
M12
M20
TARGET 25
A13
M80
6
7
TARGET 5
M28
M34
TARGET 20
M83
A15
A14
TARGET 3
M108
A16
M117
TARGET 2
M75
M84
A11
TARGET 24
M96
M99
M93
TARGET 1
LEGEND:
MAGNETIC ANOMALY
ACOUSTIC ANOMALY
SUBMERGED WRECKAGE
EXPOSED WRECKAGE
BEACON
BUOYS
CHANNEL
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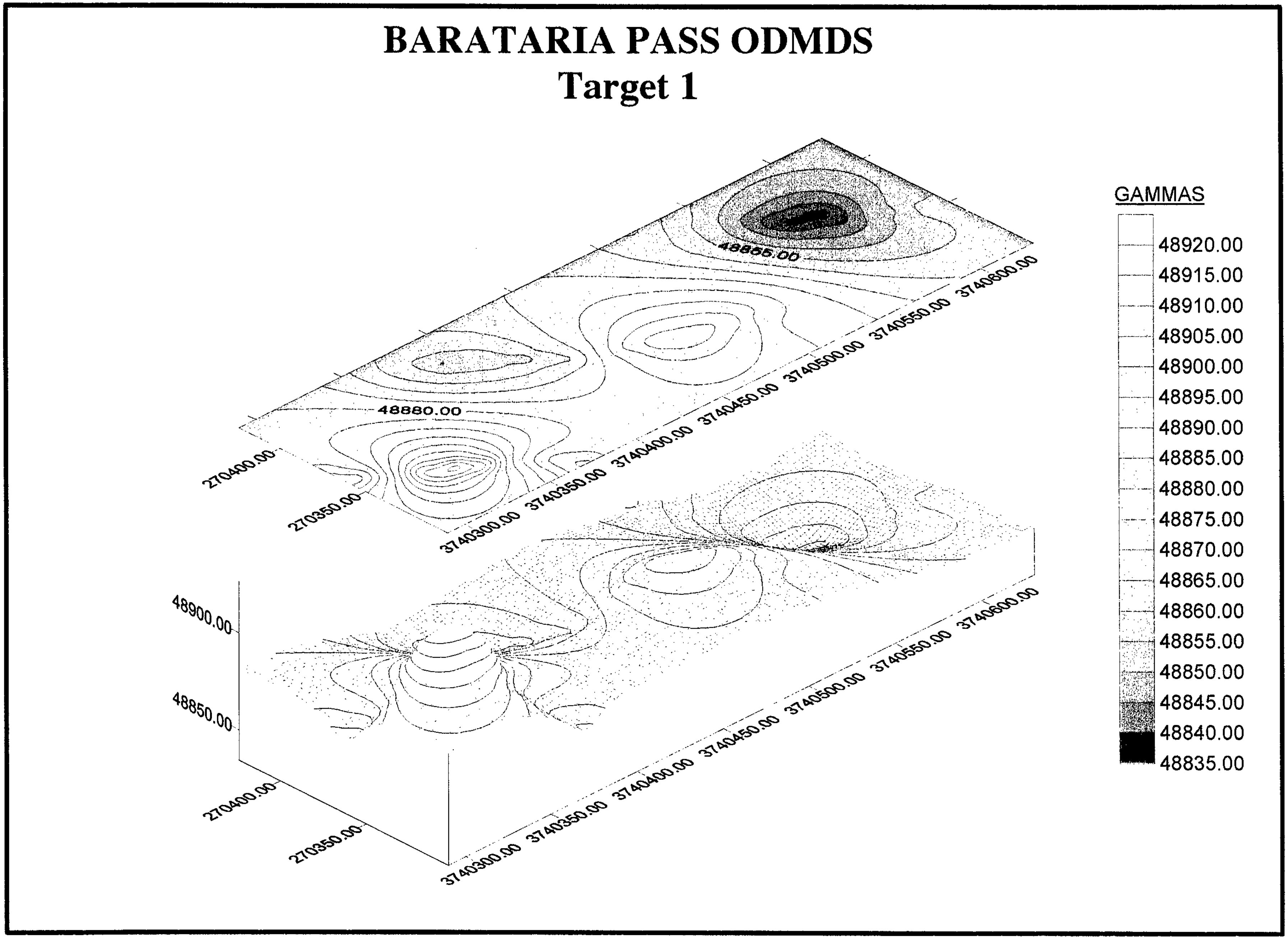

Figure 31. Magnetic contouring of Target #1 – Magnetic anomalies M93, M96, and M99

represents a positive monopolar signature of high amplitude and of long duration on an adjacent trackline to the other magnetic disturbance (Figure 32). A16 shows a linear acoustic anomaly approximately 65 feet to the port side of the line surveyed (Figure 33). This target is believed to be a piece of pipe debris of modern origin. No further study of this target is needed.

Target #6

Two magnetic disturbances comprise this target (M107 and M115). These magnetic disturbances consist of low to medium amplitude signatures of low to medium duration (Figure 34). M115 is a multi-component signature, and both anomalies are near a known shipwreck. Based upon the multi-component nature of M115, the adjacency of correlating magnetic data and the close proximity to a chartered shipwreck, the target is believed to be associated with the shipwreck. In lieu of avoidance, further study of this area should be undertaken if work is performed in the area.

Target #7

This target is comprised of two magnetic anomalies (M151 and M163). Both anomalies have medium duration, but M151 has a high amplitude signature, and M163 has a moderate amplitude signature (Figure 35). These disturbances are not typical of significant cultural resources, or of a shipwreck. This target likely represents modern ferrous debris near the main channel. No further study of this target is recommended.

Target #9

Target #9 consists of five magnetic anomalies (M98, M105, M112, M113, and M126), of which two, M98 and M126, have high amplitudes and medium to long durations (Figure 36). The other anomalies in the target have low amplitudes and short durations. These disturbances are not typical of significant cultural resources or a shipwreck. This cluster of anomalies probably represents a scatter of modern ferrous debris. No further study of the area is recommended.

Target #11

Two magnetic disturbances compose Target #11 (M147 and M160). Both anomalies have moderate amplitudes, with M147 having a dipolar signature and M160 having a multi-component signature (Figure 37). M160 also has an extremely long duration of almost two minutes. This target likely represents modern ferrous debris near the main channel. No further study of Target #11 is recommended.

Target #14

Four magnetic anomalies comprise Target #14 (M103, M122, M138, and M146). These anomalies have moderate to high amplitude magnetic signatures, and medium durations (Figure 38). Only one of the anomalies represents a multi-component signature (M146). These anomalies probably represent modern ferrous debris. The linear nature of the anomalies suggests that this target may represent a pipeline or cable in the area. These disturbances are not typical of significant cultural resources or a shipwreck. No further study of the target is recommended.

Target #16

Target #16 is comprised of two magnetic anomalies (M47 and M52), with moderate to high amplitudes and medium durations (Figure 39). These disturbances are not typical of significant cultural resources or of a shipwreck. This target probably represents modern ferrous debris. No further study of this target is recommended.

Target #17

Three magnetic anomalies compose represent this target (M97, M100, and M109). Only one of these anomalies has a significantly high amplitude magnetic signature; however, it is very short in duration (Figure 40). This target is not representative of significant cultural resources or a shipwreck. It likely represents modern

ferrous debris. No further study of this target is recommended.

Target #18

Target #18 likely represents a cable or pipeline segment. It is comprised of three magnetic disturbances that form a linear shape on three adjacent lines (M119, M129, and M135). M129 has a high amplitude magnetic signature of 340.5 gammas, which is typical of pipelines or cables (Figure 41). No further study is recommended in this area.

Target #19

This target is comprised of three magnetic anomalies (M144, M145, and M154). Due to the close proximity of Target #19 to a chartered shipwreck and the relatively high magnetic field charges within the target area, this target likely represents shipwreck scatter from a recorded shipwreck near the target. One anomaly (M154) has a significantly high amplitude magnetic signature of 924 gammas (Figure 42). The other anomalies in the target may be smaller ferrous debris associated with the wreck, because they have smaller amplitude signatures and shorter durations. Further study of this area is recommended, in lieu of avoidance.

Target #20

Target #20 is comprised of three anomalies (M83, A14, A15). Magnetic anomaly M83 has a signature that is low in amplitude and of short duration. Acoustic anomalies A14 and A15 appear to be curtains, or large masses, of shrimp on the bottom of the survey area (Figures 43 and 44). This target is not representative of a significant cultural resource. Therefore, no further study of this target is recommended.

Target #21

Three anomalies comprise Target #21 (M53, A9, and A10). Magnetic anomaly M53 has a signature that is low in amplitude and of short duration. Acoustic anomalies A9 and A10 are representative of drag scars from shrimp boats (Figures 45 and 46). This target is not representative of a significant cultural resource. No further study of this target is recommended.

Target #22

One magnetic anomaly (M4) and one acoustic anomaly (A1) comprise Target #22. The magnetic signature of anomaly M4 is high in amplitude, and it is multi-component with long duration. The acoustic anomaly (A1) shows a veil of shrimp (Figure 47). This target is not representative of a significant cultural resource. No further study of this target is recommended.

Target #23

This target (A17) consists of one acoustic anomaly. The acoustic image shows a scatter of debris from 25 feet to 82 feet to the port side of the survey line run (Figure 48). This is likely modern debris. No magnetic anomalies were observed in the area. This target is not representative of a significant cultural resource. No further study of this target is recommended.

Target #24

Target #24 is one acoustic anomaly (A11). It is situated 27.6 feet to 55.7 feet starboard from the survey line run (Figure 49). This target likely represents a veil of shrimp. No magnetic anomalies were observed in this area. This target is not representative of a significant cultural resource. No further study of this target is recommended.

Target #25

Two anomalies comprise Target #25 (M80 and A13). The magnetic signature of M80 is low in amplitude, with a medium duration. The acoustic image of A13 shows a veil of shrimp along the bottom (Figure 50). This target represents a combination of modern debris and marine life. No further study of this target is recommended.

Discussion

As noted above, NOAA Nautical Chart No. 11352/1995 identifies seven shipwrecks

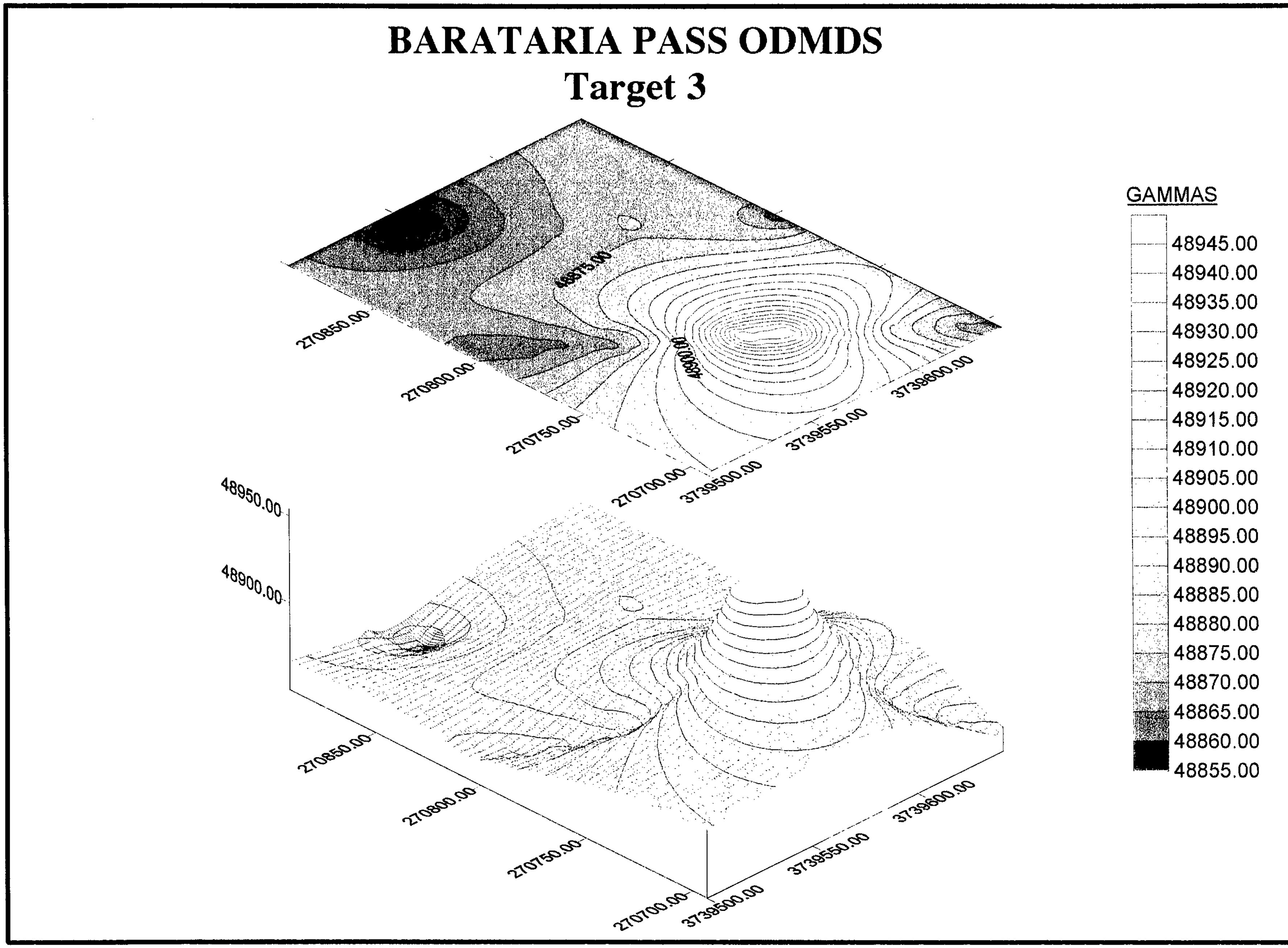

Figure 32. Magnetic contouring of Target #3 – Magnetic anomalies M108 and M117

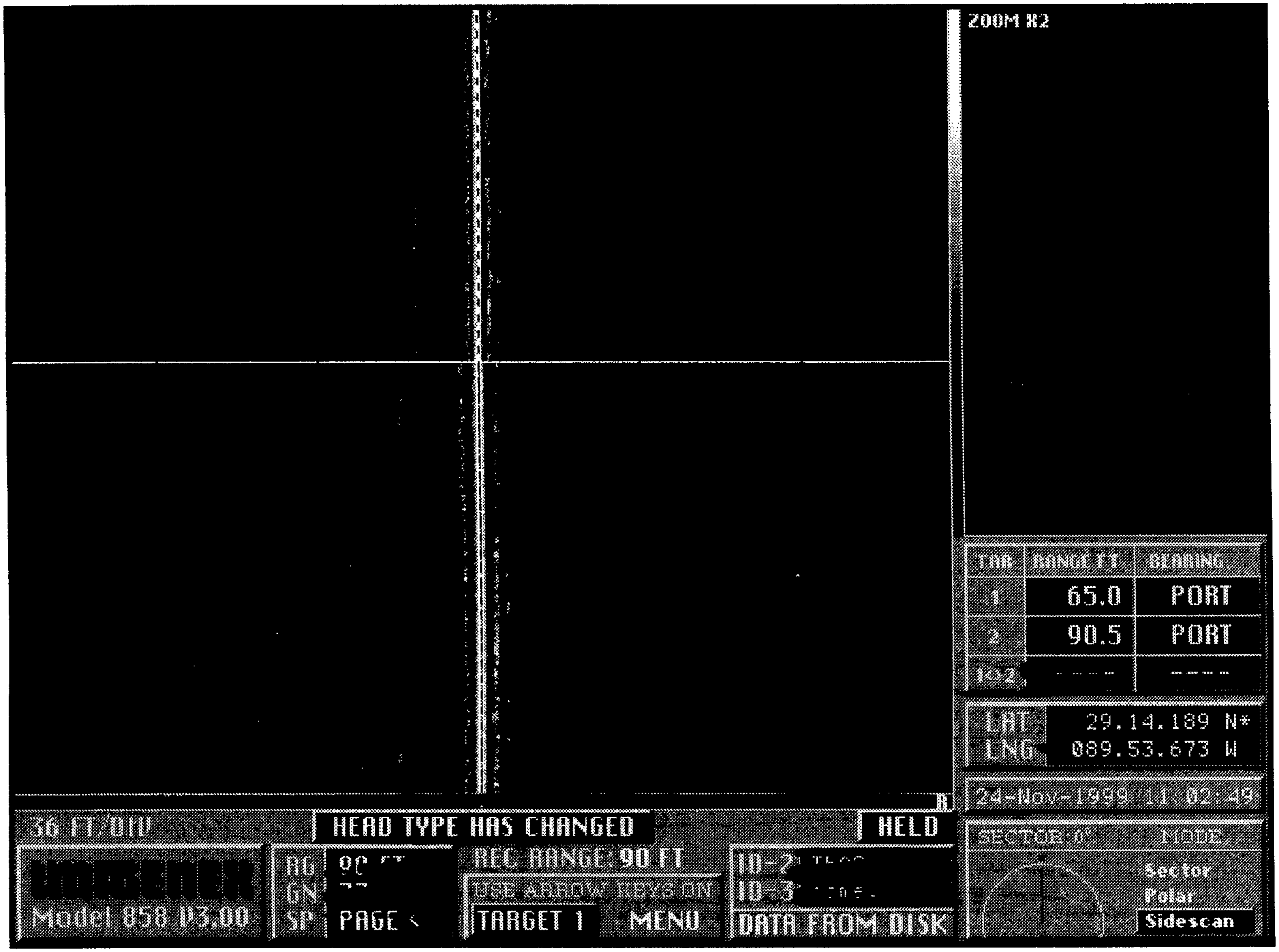

Figure 33. Acoustic Image of Target #3 – Acoustic anomaly A16

BARATARIA PASS ODMDS
Target 6

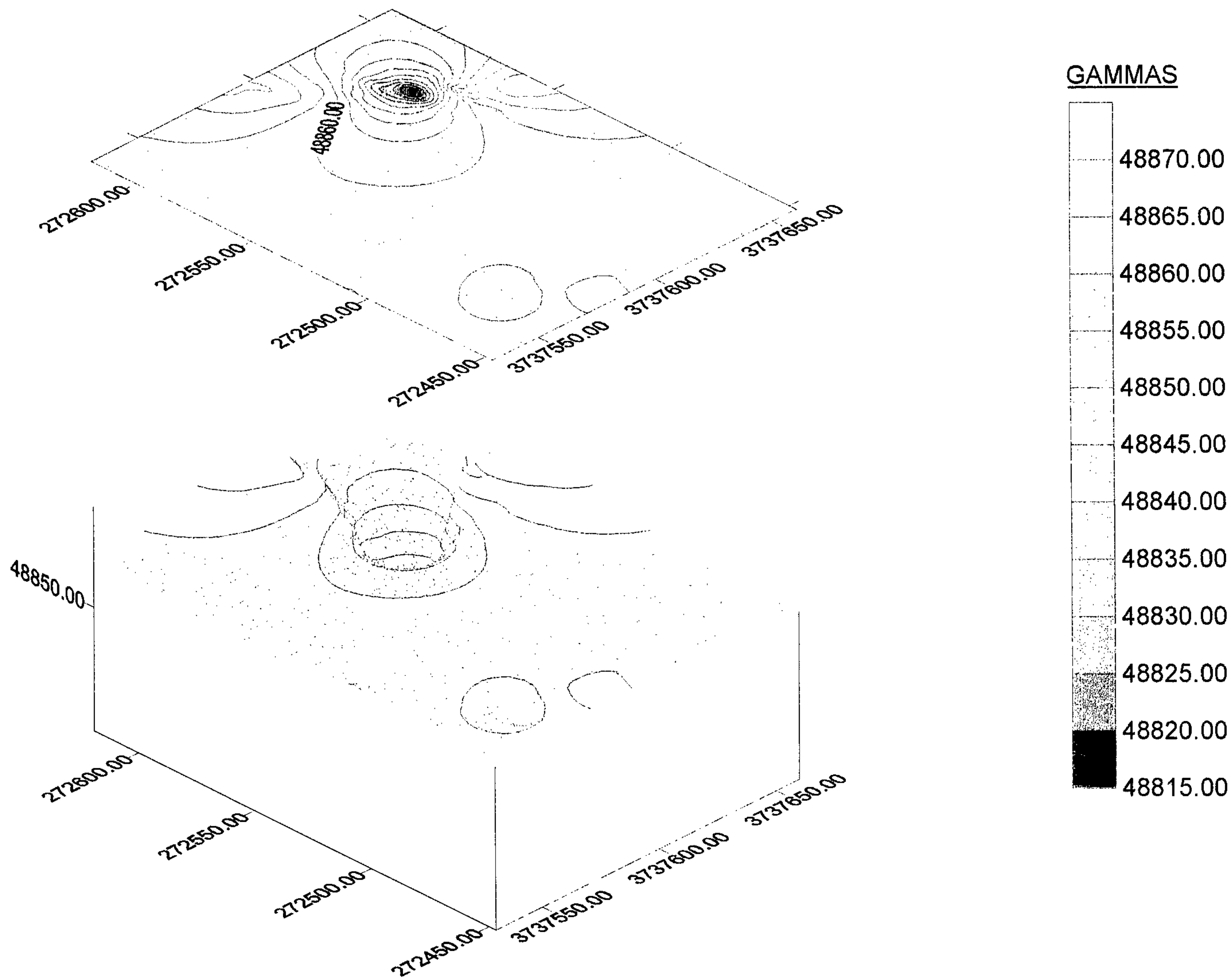

Figure 34. Magnetic contouring of Target #6 – Magnetic anomalies M107 and M115

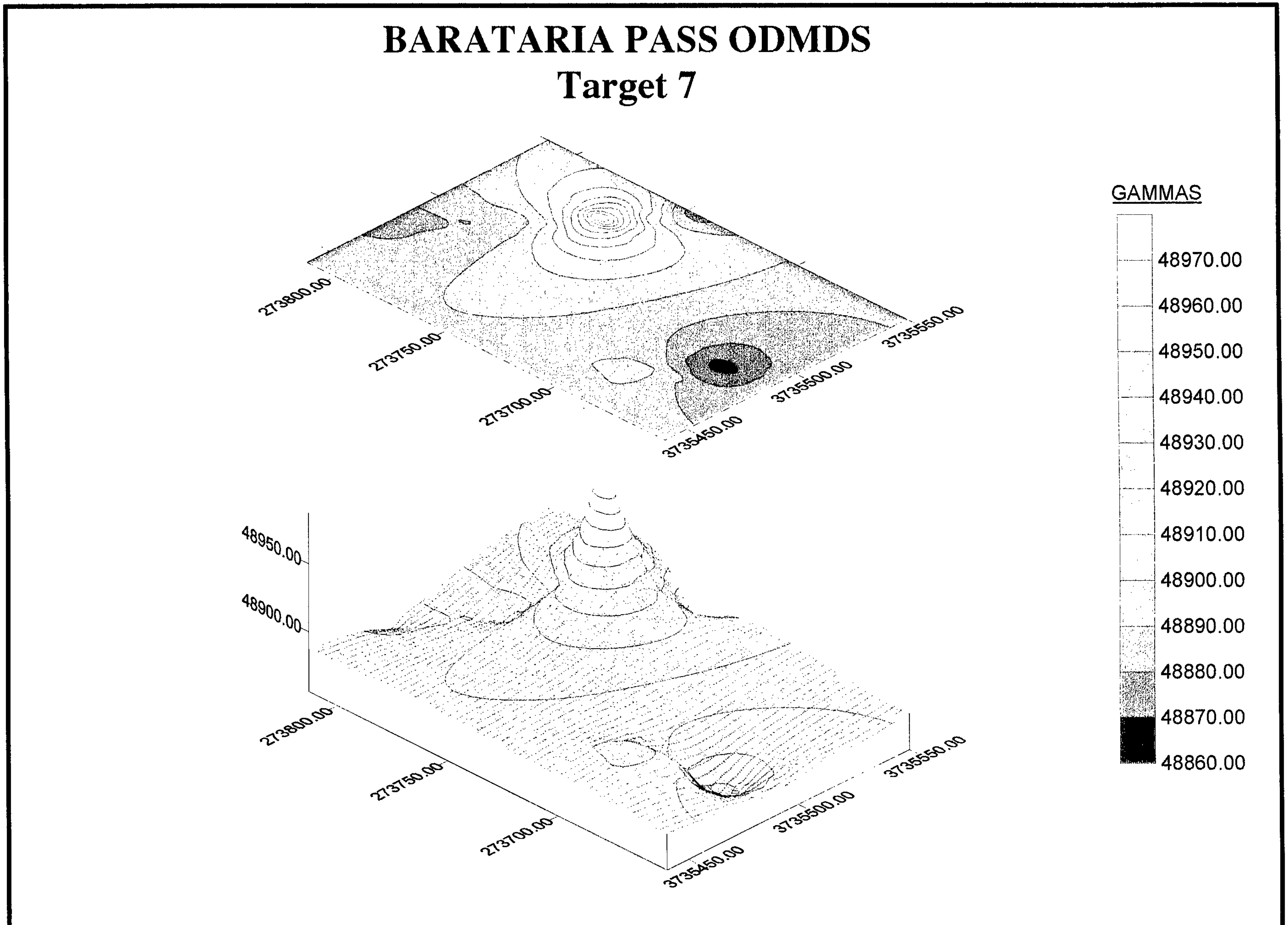

Figure 35. Magnetic contouring of Target #7 – Magnetic anomalies M151 and M163

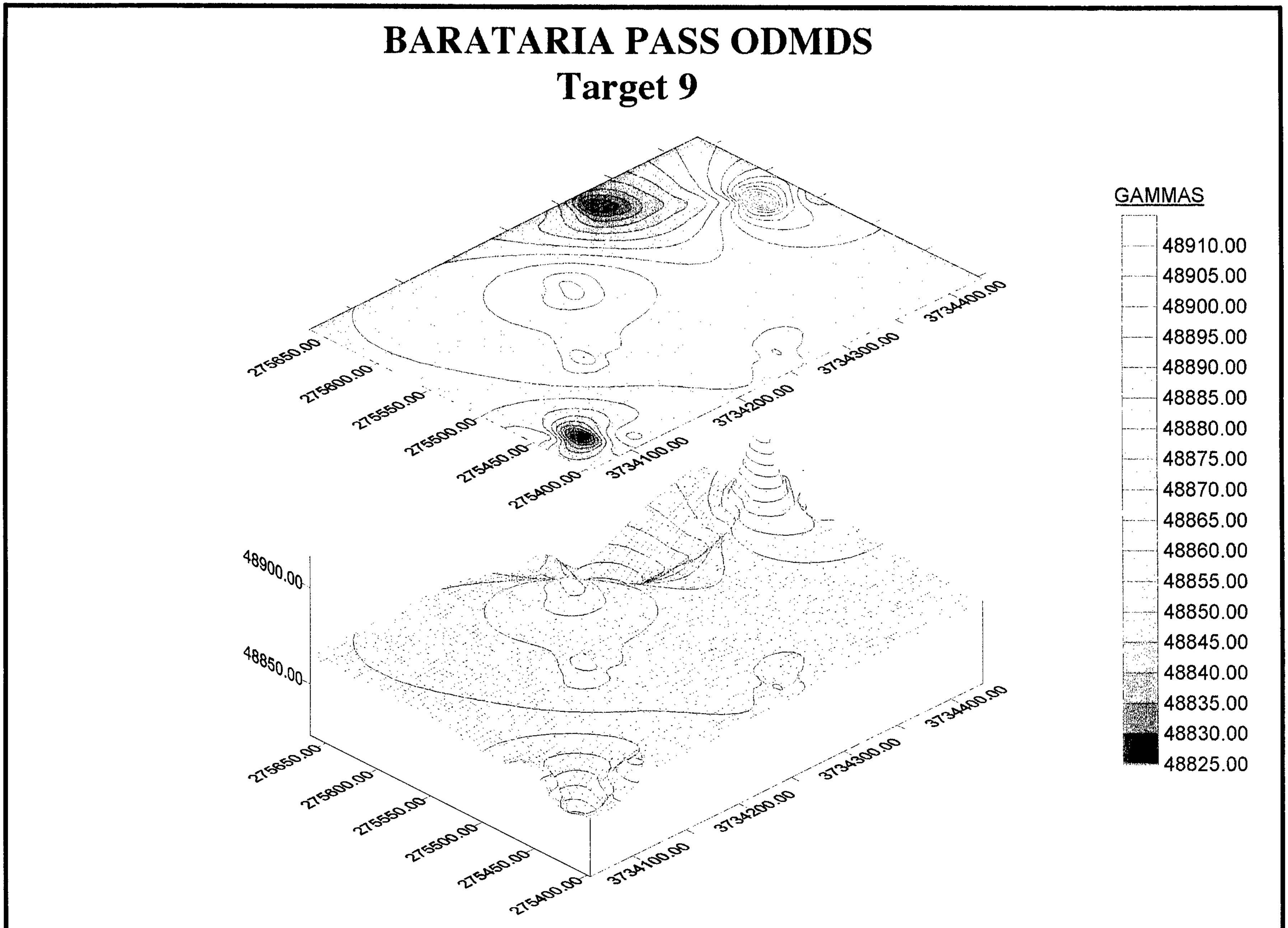

Figure 36. Magnetic contouring of Target #9 – Magnetic anomalies M98, M105, M112, M113, and M126

BARATARIA PASS ODMDS
Target 11

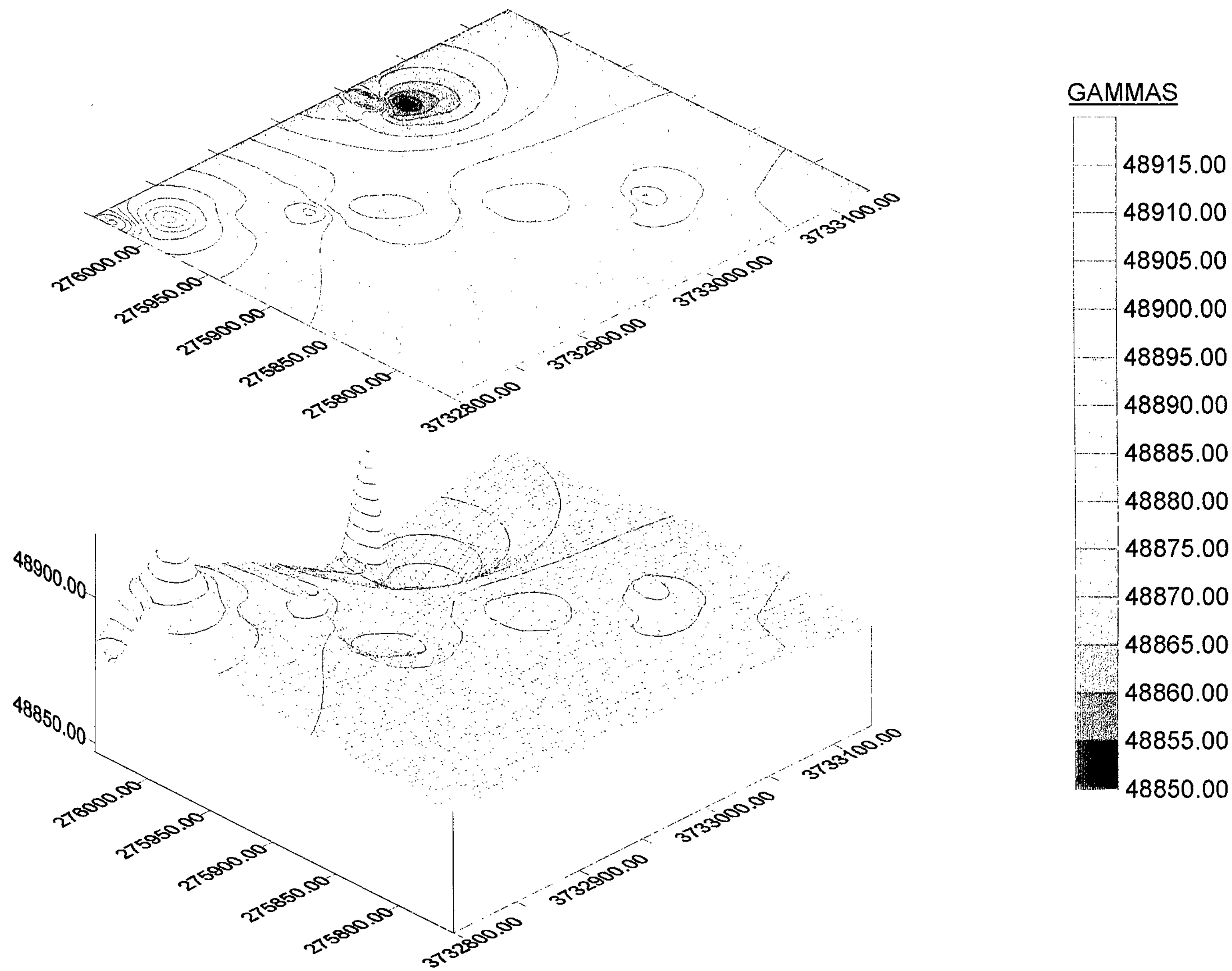

Figure 37. Magnetic contouring of Target #11 – Magnetic anomalies M147 and M160

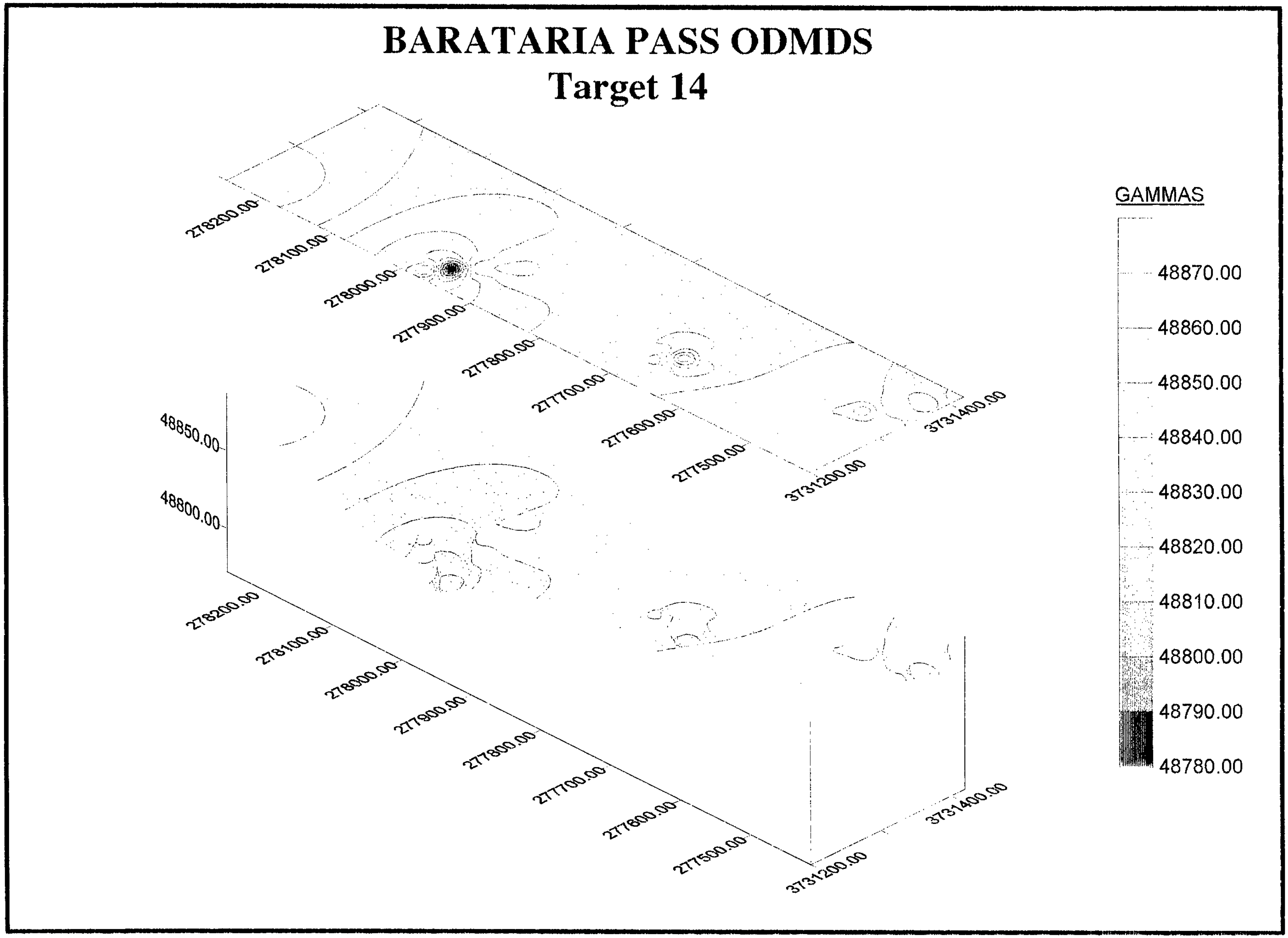

Figure 38. Magnetic contouring of Target #14 – Magnetic anomalies M103, M122, M138 and M146

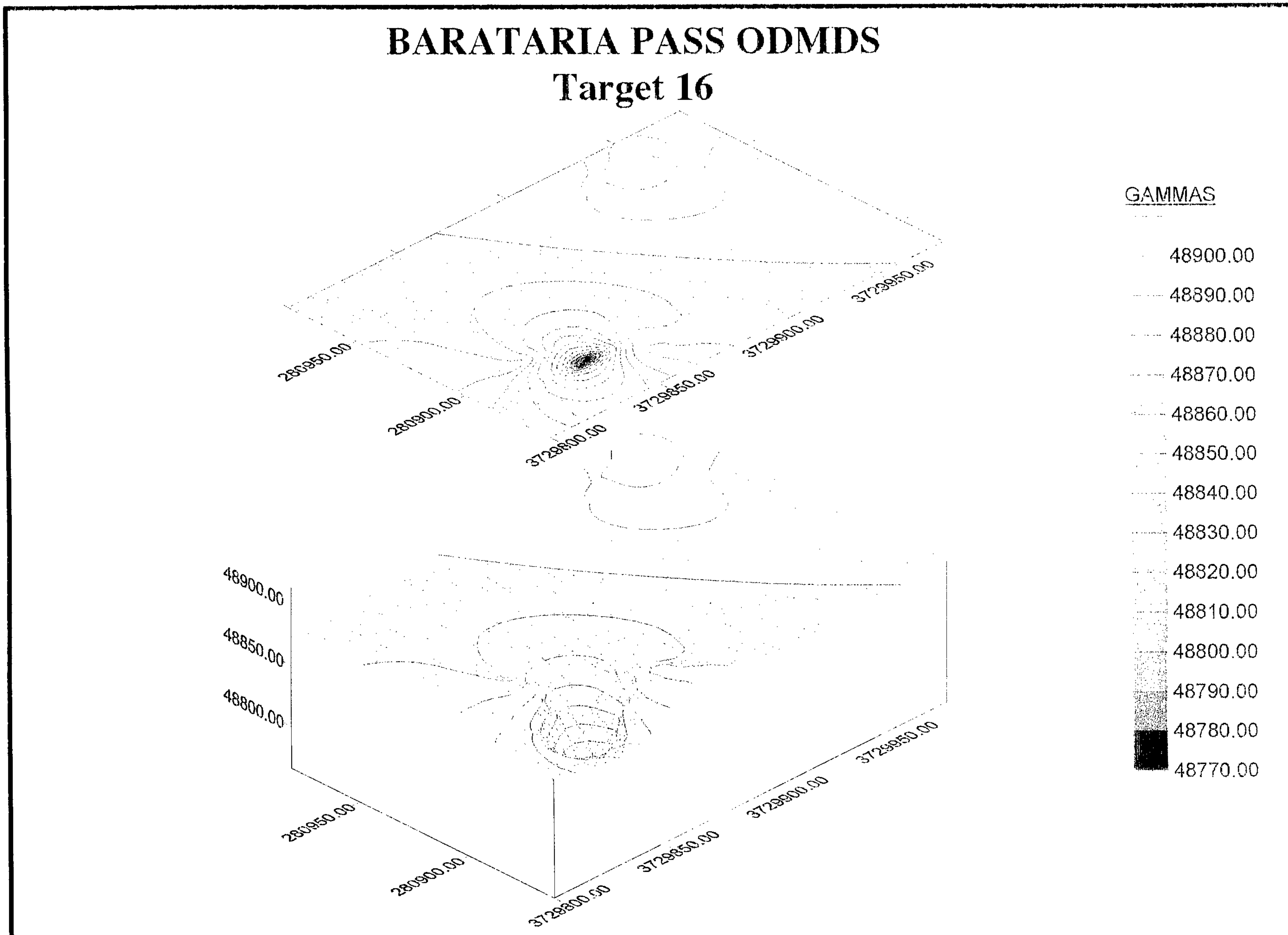

Figure 39. Magnetic contouring of Target #16 – Magnetic anomalies M47 and M52

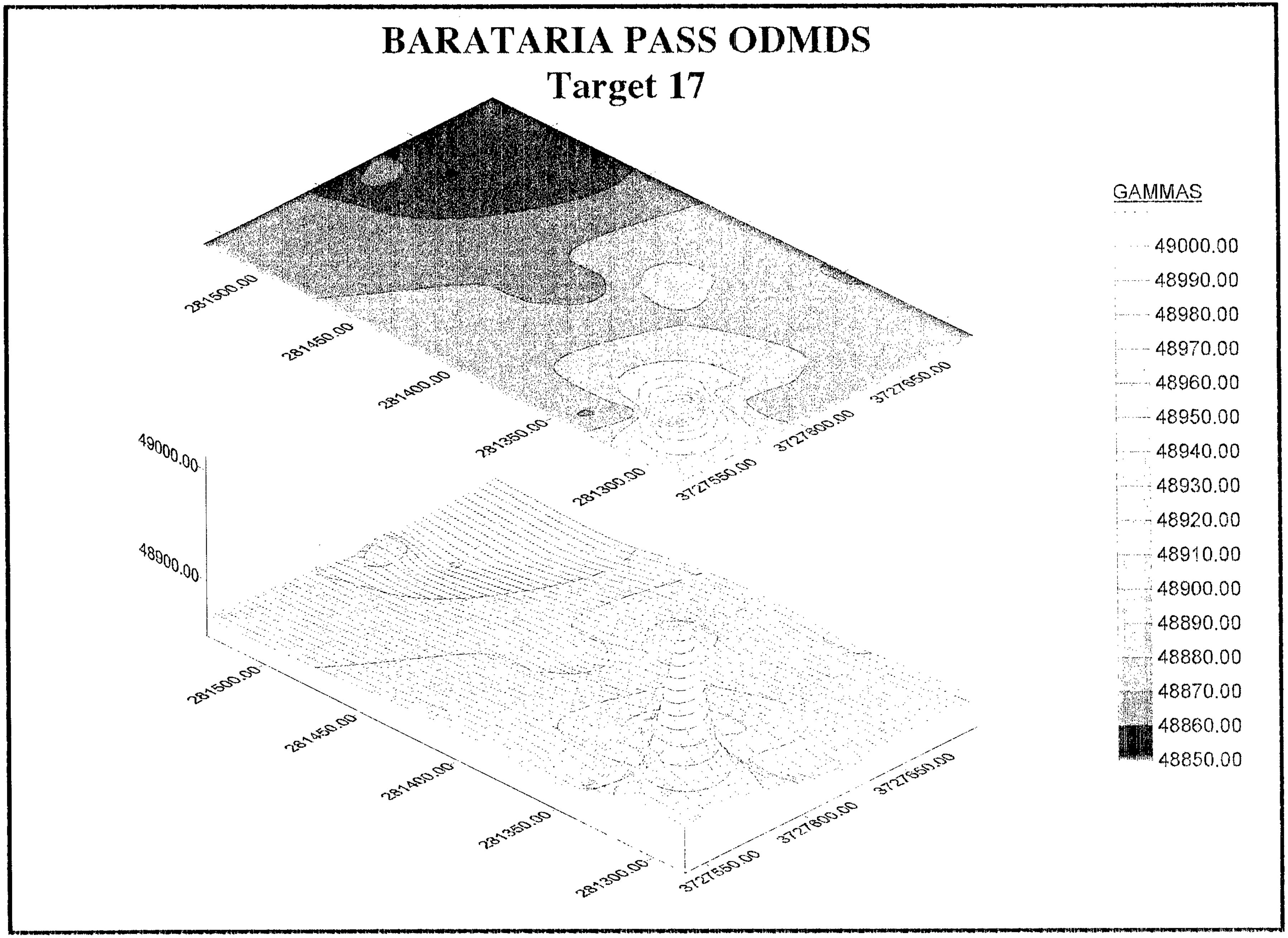

Figure 40. Magnetic contouring of Target #17 – Magnetic anomalies M97, M100 and M109

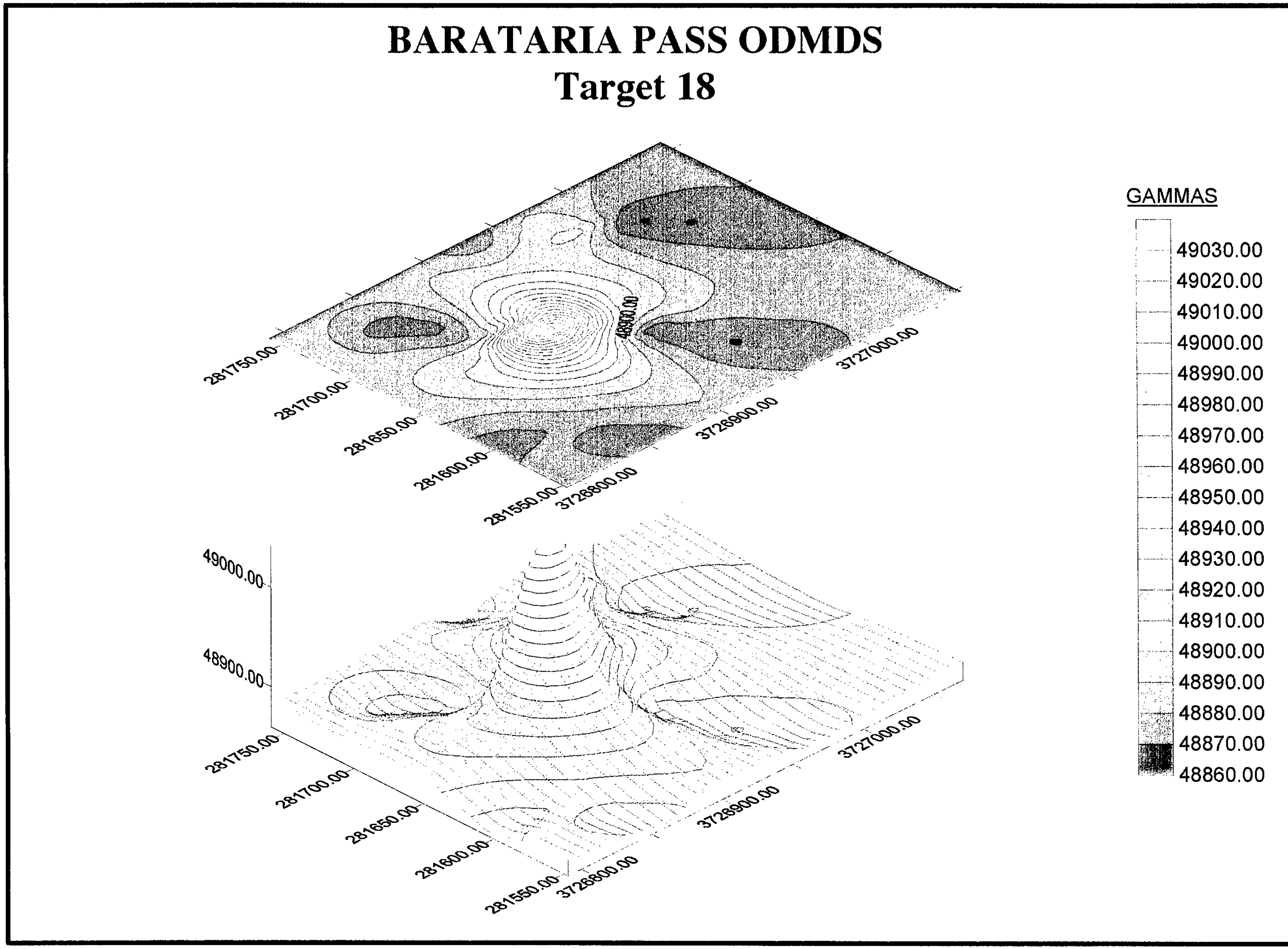

Figure 41. Magnetic contouring of Target #18 – Magnetic anomalies M119, M129, and M135

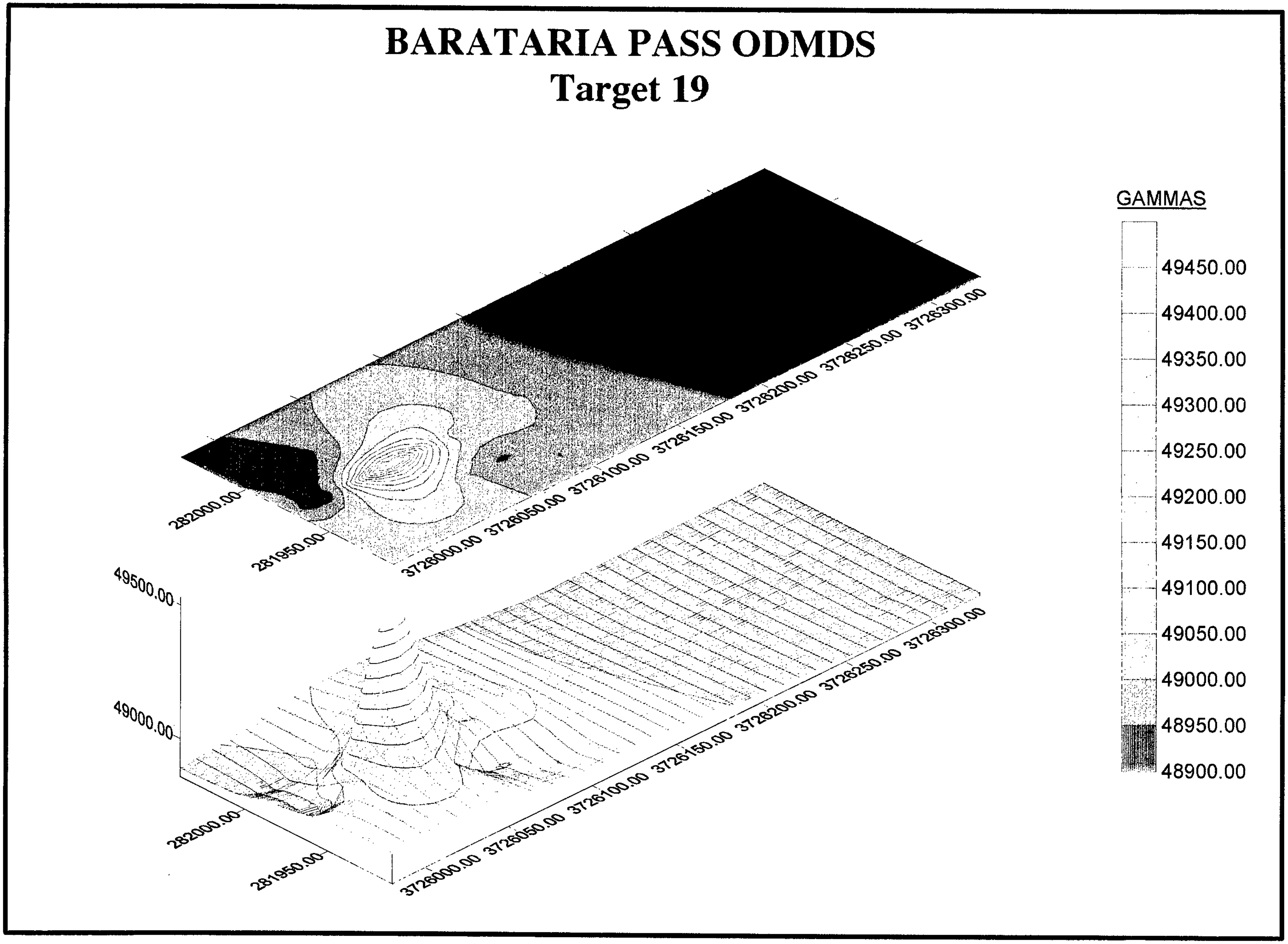

Figure 42. . Magnetic contouring of Target #19 – Magnetic anomalies M144, M145 and M154

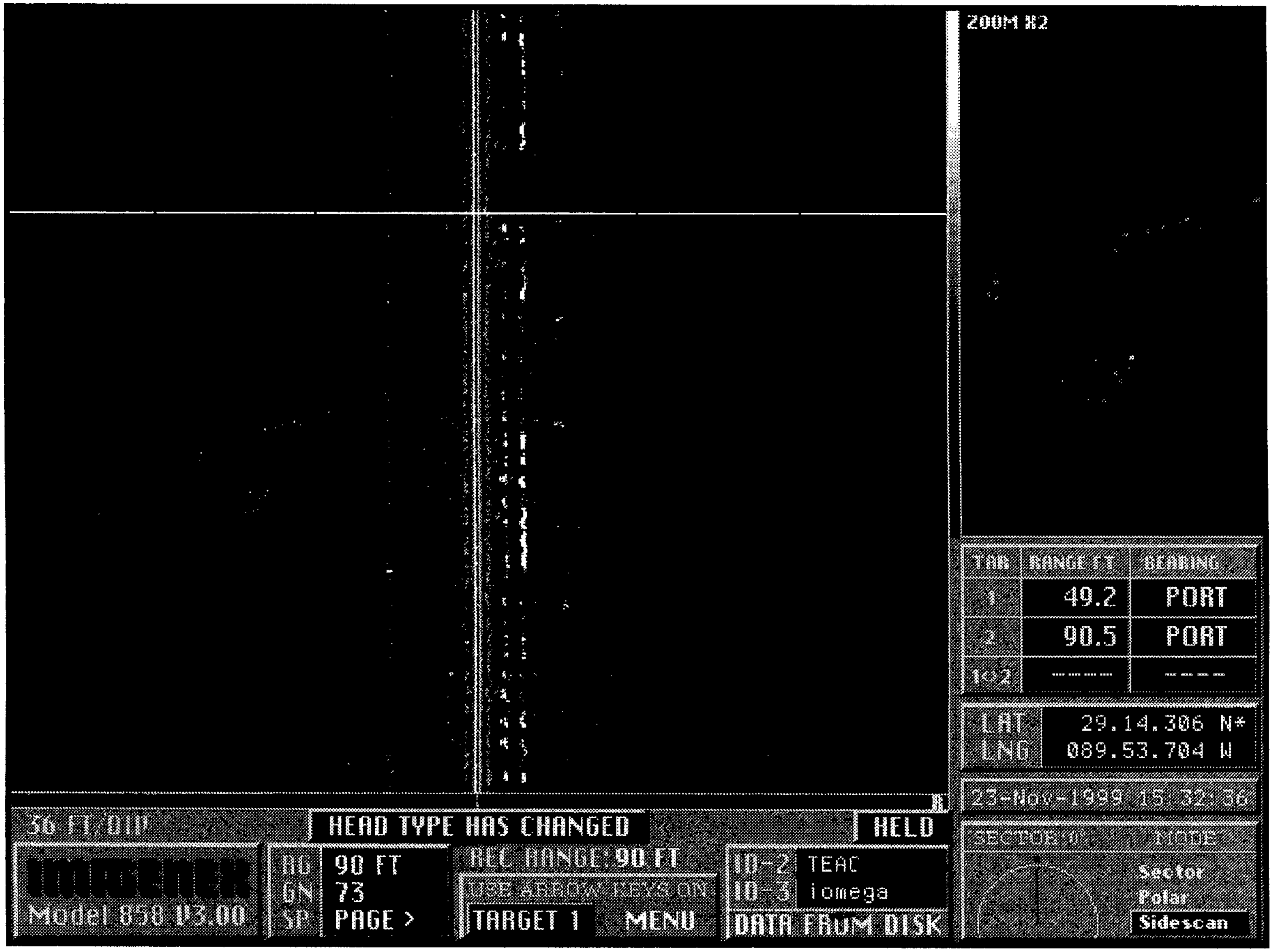

Figure 43. Acoustic Image of Target #20 – Acoustic anomaly A14

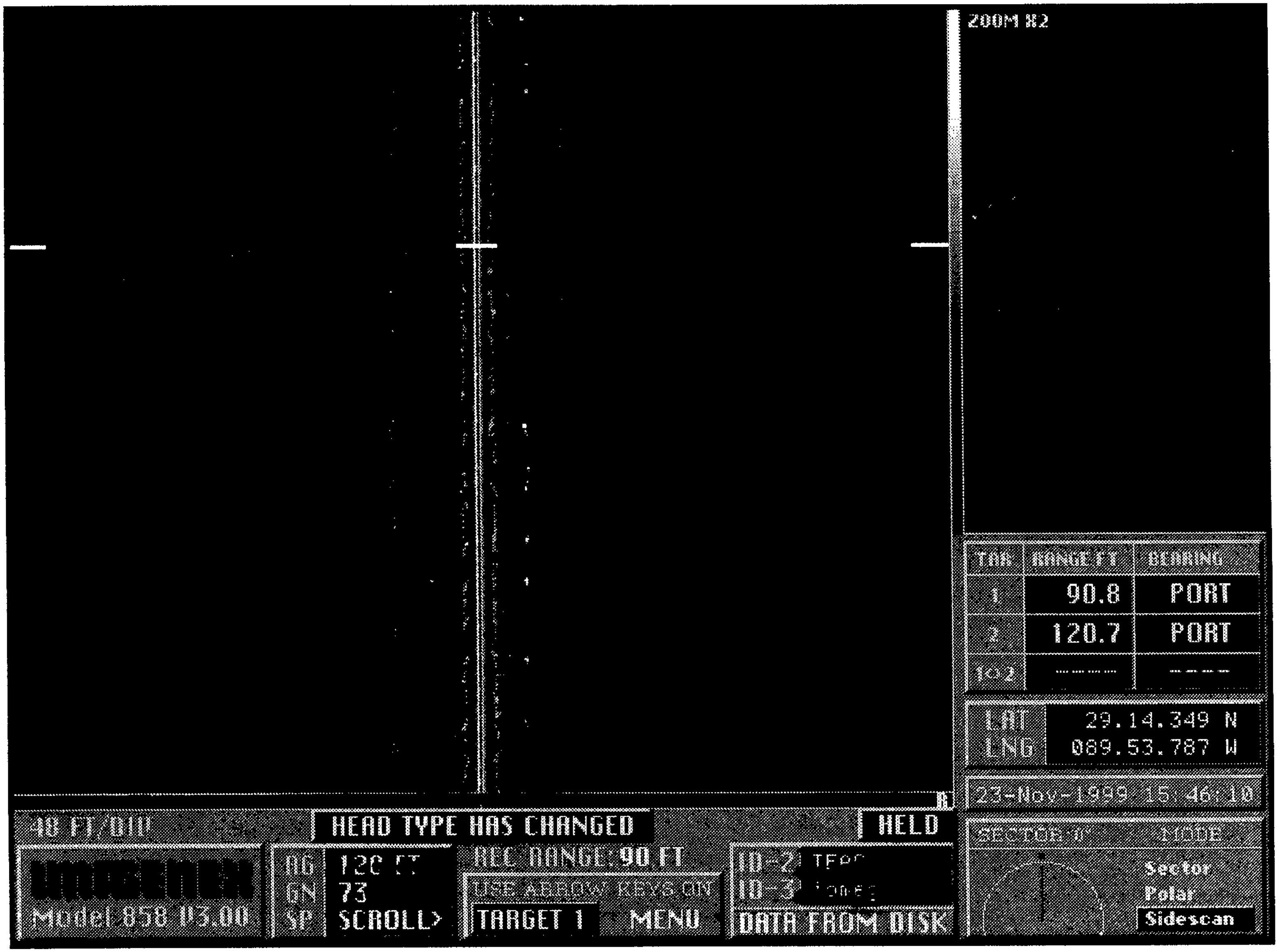

Figure 44. Acoustic Image of Target #20 – Acoustic anomaly A15

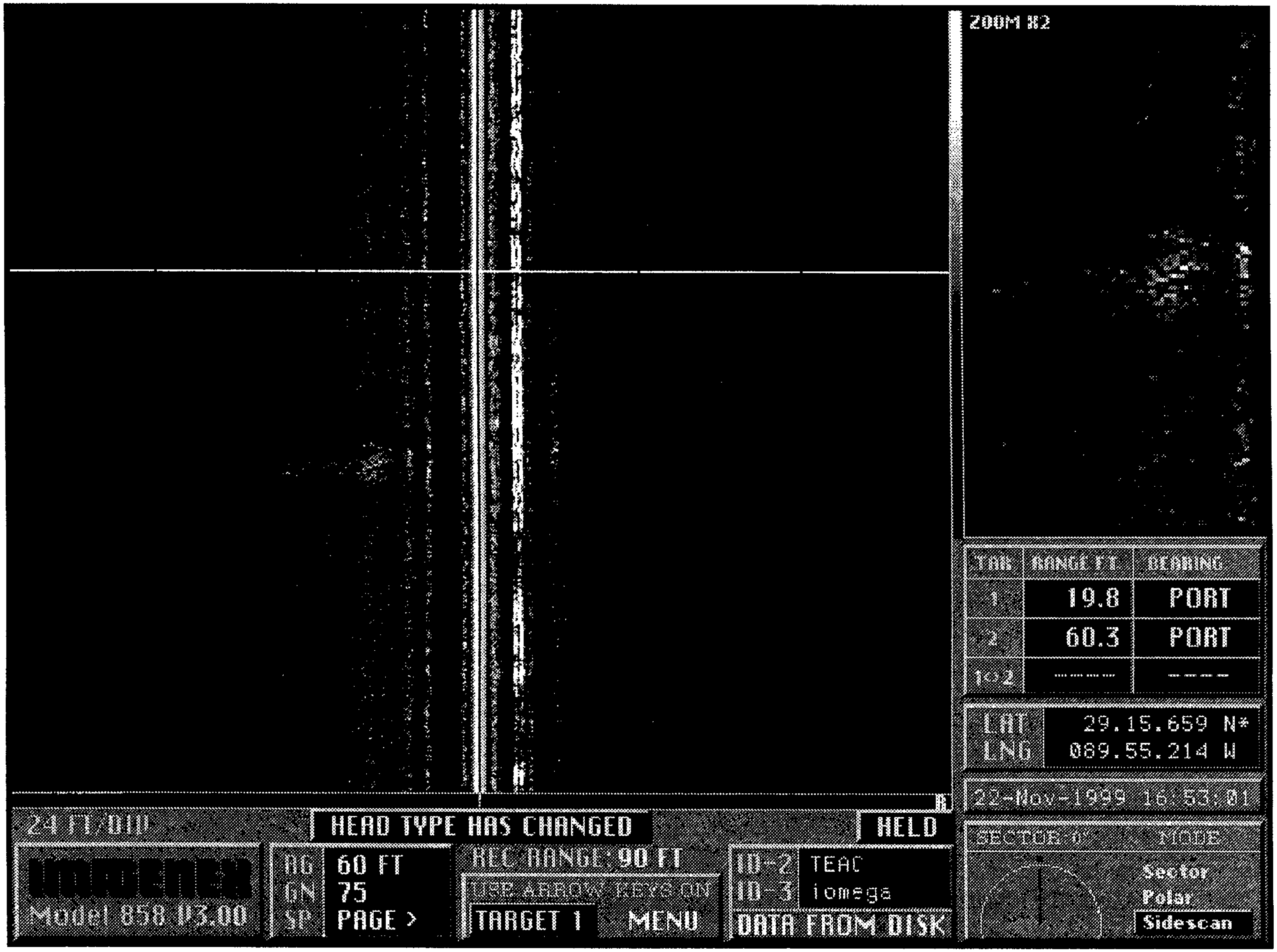

Figure 45. Acoustic Image of Target #21 – Acoustic anomaly A9

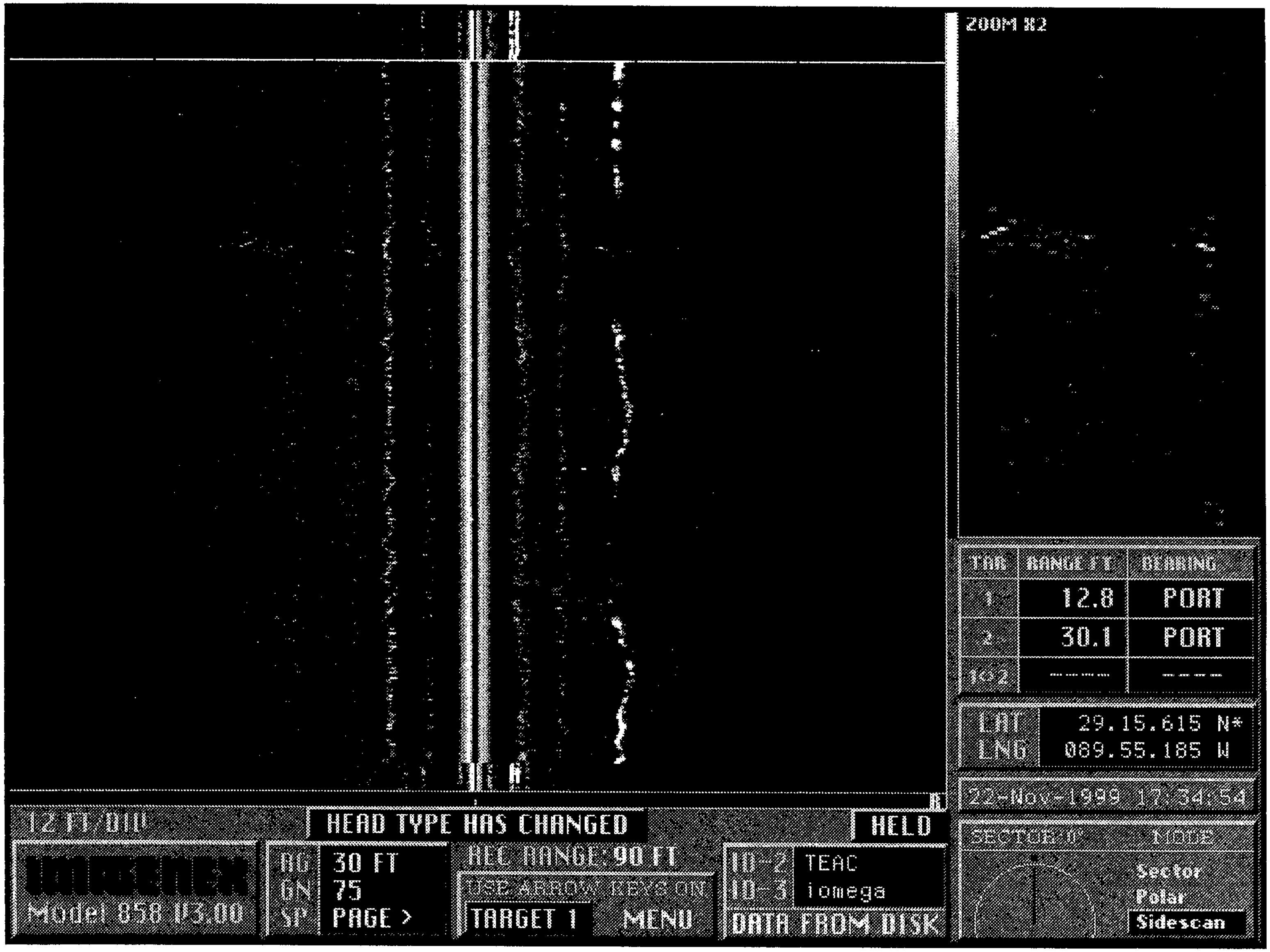

Figure 46. Acoustic Image of Target #21 – Acoustic anomaly A10

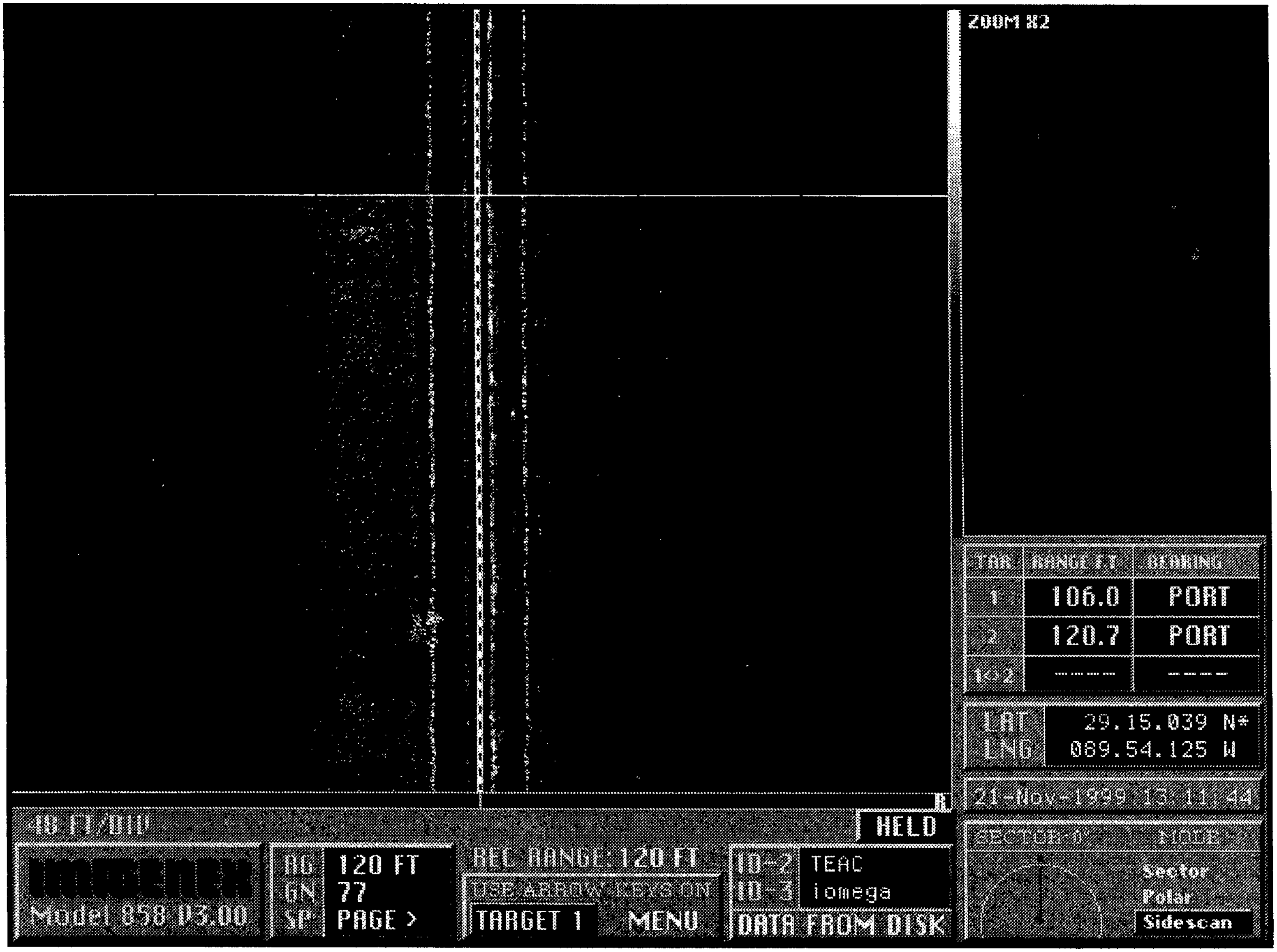

Figure 47. Acoustic Image of Target #22 – Acoustic anomaly A1

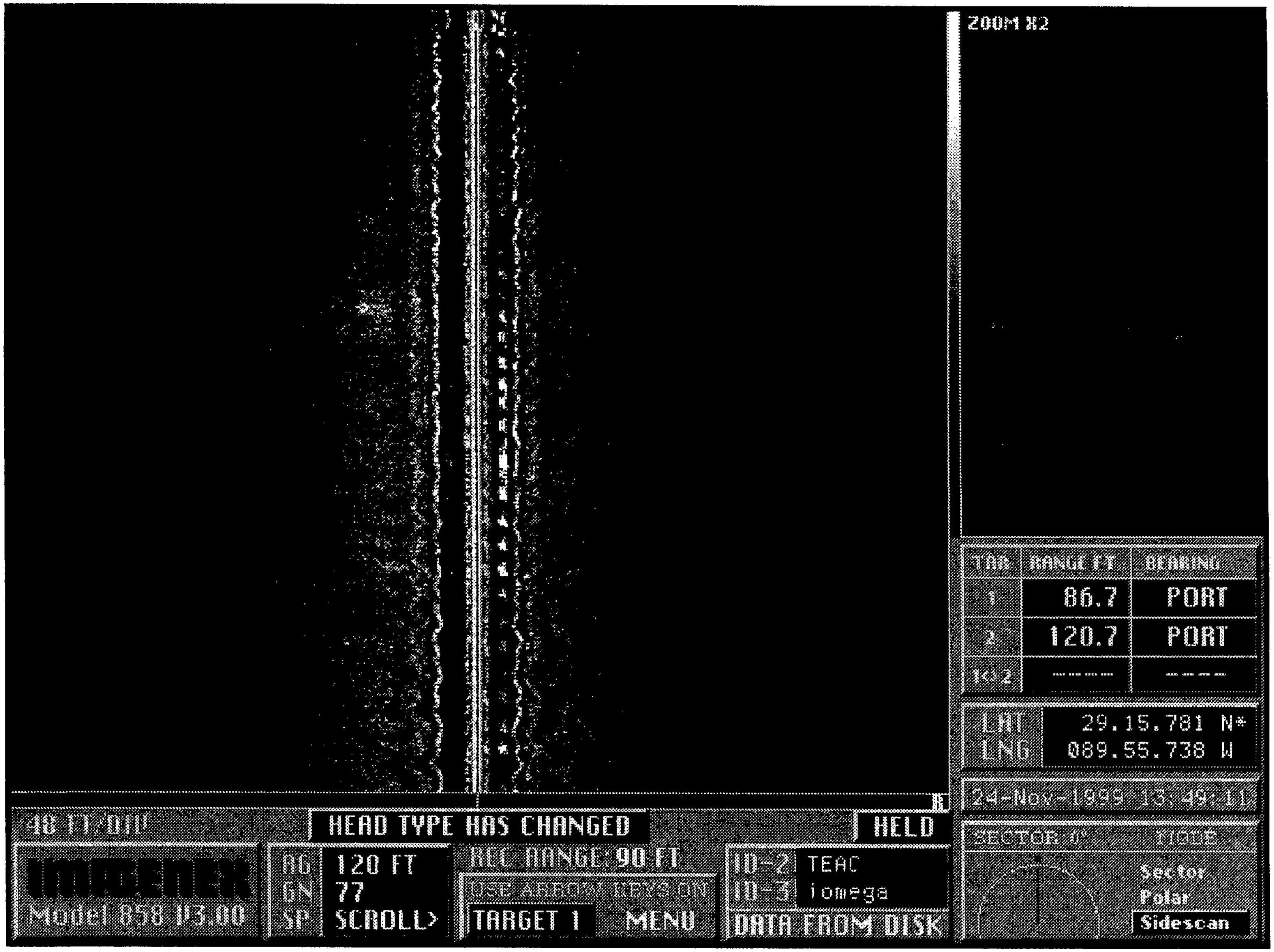

Figure 48. Acoustic Image of Target #23 – Acoustic anomaly A17

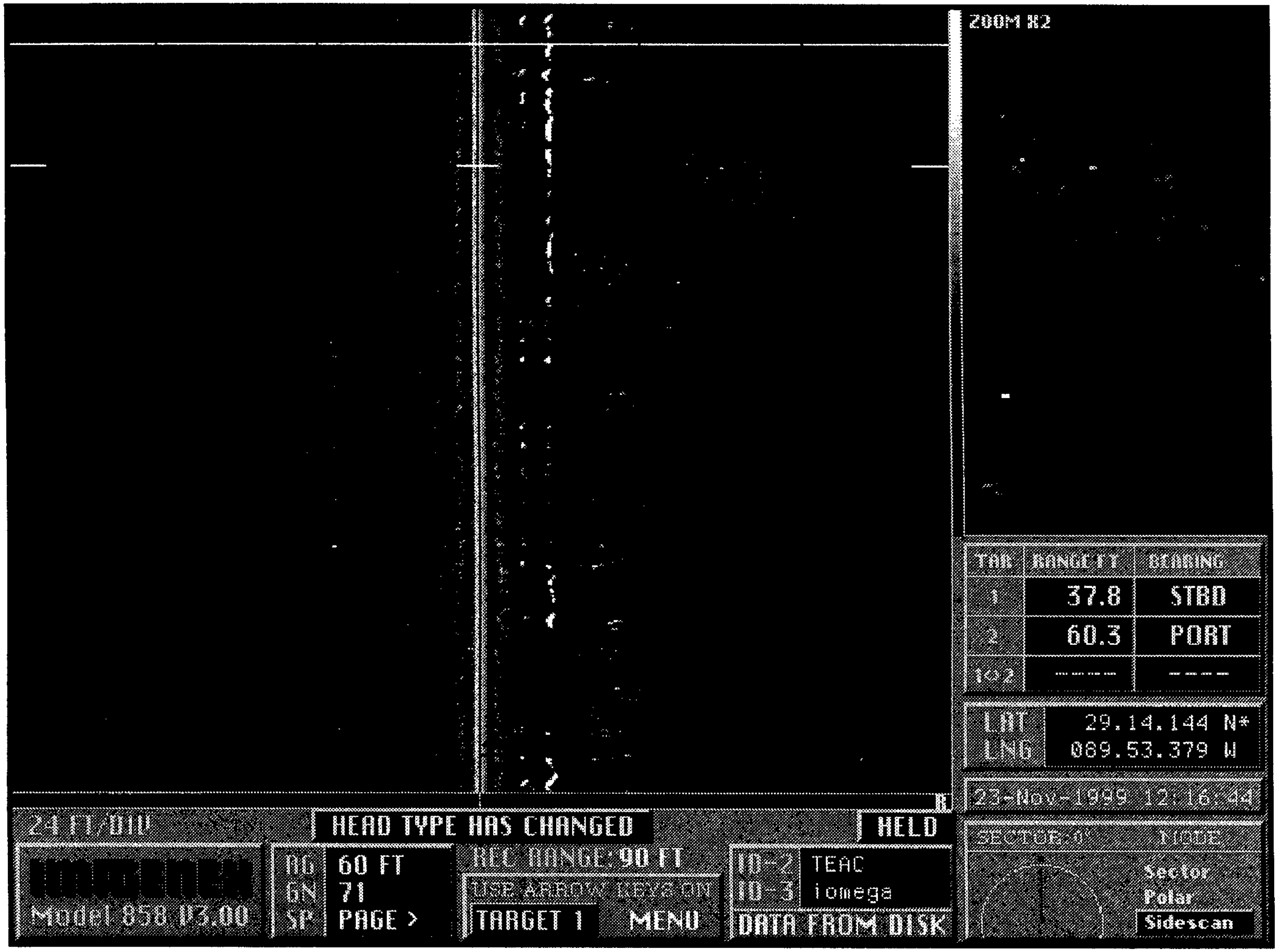

Figure 49. Acoustic Image of Target #24 – Acoustic anomaly A11

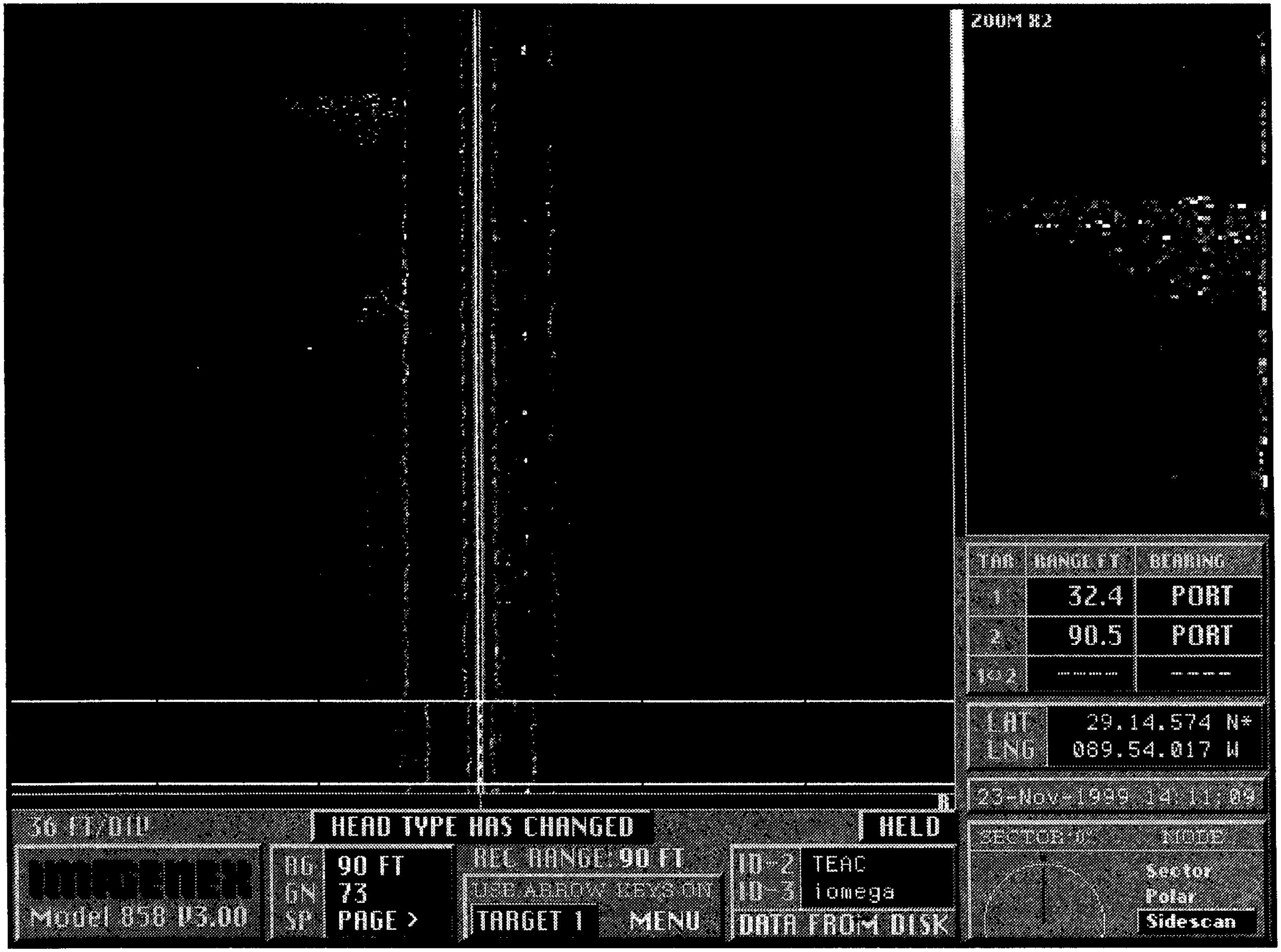

Figure 50. Acoustic Image of Target #25 – Acoustic anomaly A3

within two miles of Barataria Pass ODMDS (Figure 24). Consultation at NOAA in 1999 to gather the latest information on wrecks in the project area provided a chart (Figure 25) showing eight wrecks. The two NOAA charts are essentially the same, except for the addition of one wreck, which is located approximately half a mile west of the ODMDS. Two wrecks are located in the survey area; one wreck is totally within the ODMDS, at the southern end, and one wreck is partially situated in the survey area, on its northwest boundary. The two wrecks that are situated within the survey area are unidentified; only one of the wrecks referenced is identified, the *Barbara Jean* (AWOIS Record No. 361)(Table 6).

In lieu of avoidance, two targets are recommended for diver inspection. These two targets (Targets 6 and 19) appear to be associated with the two known shipwrecks depicted on NOAA Chart No. 11352/1995.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

This report presents the results of a marine archeological remote sensing survey for the Barataria Pass Ocean Dredged Material Disposal Site, Louisiana. These investigations were conducted under Contract No. (DACW29-97-D-0018, DO0022) in November 1999, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). The study was undertaken to assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended. Approximately 108.6 linear miles were surveyed during this remote sensing survey. The survey area for this project consisted of one continuous survey block measuring approximately 2,538.2 ft (773.7 M) wide, by 19,776.5 ft (6,029.4 m) long. The primary objective of this study was to locate any historic shipwrecks or other potentially significant cultural resources in the project area.

The marine remote sensing survey, utilizing a side scan sonar, proton precession magnetometer, recording fathometer, and DGPS, produced 163 magnetic anomalies and 17 acoustic anomalies. From these anomalies, 25 target clusters were identified. Two of these targets may represent possible significant cultural resources or shipwrecks (Targets 6 and 19). Targets 6 and 19 both have magnetic signatures that are indicative of possible shipwrecks, and that appear to be associated with two chartered shipwrecks in the study area. In lieu of avoidance, further study of these two targets to evaluate their significance applying the National Register criteria (36 CFR 60.4[a-d]), is recommended.

The remaining targets represent areas of geomorphology, marine life, and scattered modern debris. No further study of these targets is recommended.

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APPENDIX I

SCOPE OF WORK

CEMVN-PM-RN 14 June 1999

Scope of Services
Remote Sensing Survey of Barataria Pass, Ocean Dredged Material Disposal Site, Louisiana

1. Introduction. This delivery order requires the performance of a remote sensing survey designed to locate submerged cultural resources which may be impacted by disposal of dredged material in the Barataria Pass Ocean Dredged Material Disposal Site (ODMDS). This area is located along coastal Louisiana at the Barataria Bay Waterway(BBWW).

Adverse impacts to cultural resources can result from the disposal of dredged material to any significant cultural resources at the site. Adverse impacts include: 1) increase weight of sediments on any significant shipwreck, and 2) localized burial of possible shipwrecks changing their environment and possibly increasing the rate of decay. While the temporary mounding of dredged material may occur within the disposal sites, the mounds do disperse fairly quickly. The disposed sediments are reworked by waves and littoral currents and are moved out of the ODMDS. The direction and speed of currents are variable, but sediments generally drift toward the west under most circumstances.

2. Background Information. The coastal area of Louisiana has been an important navigation route since prehistoric times. Prehistoric vessels were used in Gulf waters to exploit marine resources. Evidence of this has been uncovered at several archeological sites in the state. In the colonial period, waterborne commerce was associated with French and Spanish trade and transportation routes. Later during the American Period water transportation was related to plantations established along various bayous emptying into the Gulf of Mexico. At present, there are 42 recorded shipwrecks in the coastal waters of Louisiana and numerous wrecks in the rivers and bayous.

The number of recorded shipwrecks represents only a small fraction of the wrecks that are expected to exist in the project vicinity. The project area, as a portion of the Louisiana coastal waters, had the potential to contain colonial era (ca. 1718-1803) shipwrecks. The 1979 discovery of the El Nuevo Constante, a Spanish sailing vessel lost in 1766 in similar waters off the coast of Cameron Parish, amply illustrates this potential. The probability for shipwrecks in the project vicinity increase for nineteenth and twentieth century vessels due to the increased maritime commerce in the region.

A brief navigational history of the coastal water of the Gulf of Mexico and an inventory of known shipwrecks in the study area is provided in the report entitled A History of Waterborne Commerce And Transportation Within the U.S. Army Corps of Engineers, New Orleans District and an Inventory of Known Underwater Cultural Resources prepared by Coastal Environments, Inc. This study documents several shipwrecks in the vicinity of the project area.

Study Area. The study area consists of the designated ODMDS referenced above. The Barataria Pass Ocean Dredged Material Disposal Site is located at the gulfward end of Barataria Bay (Figure 1). The ocean disposal is in an area running approximately 3 miles in length and 0.5 miles wide, parallel to the east side of the channel (Figure 2). In 1977, the EPA approved the site for interim use, based on historical use of the site since 1960. Since 1976, the bar channel reach of the BBWW has been dredged six times. Material is removed using hydraulic cutterhead dredges ans is pumped via floating and submerged pipelines into the ODMDS. The exact coordinates as provided by Operations Division are:

29° 16'10"N., 89° 56' 20"W.
29° 14'19"N., 89° 53' 16"W.
29° 14'00"N., 89° 53' 36"W.
29° 16'29"N., 89° 55' 59"W.

4. **General Nature of the Work.** The purpose of this study is to locate and identify historic shipwrecks in the above noted project area. The study will employ a systematic magnetometer and side scan sonar survey of the study area using precise navigation control and a fathometer to record bathymetric data. All potentially significant anomalies will be briefly investigated via additional intensive survey and probing of the water bottom (if possible). No diving will be performed under this delivery order.

The project requires historic background research, followed by the intensive survey of the proposed ODMDS area. An inventory of all magnetic, sonar, and bathymetirc anomalies will be prepared. The background research, field survey, and data analyses will be documented in a brief management summary and comprehensive technical report.

5. **Study Requirements.** The study will be conducted utilizing current professional standards and guidelines, including, but not limited to:

the National Park Service's National Register Bulletin entitled "How to Apply the National Register Criteria for

Evaluation";

the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation as published in the Federal Register on September 29, 1983;

Louisiana's Comprehensive Archeological Plan dated October 1, 1983;

the Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties" and

the Louisiana Submerged Cultural Resources Management Plan published by the Louisiana Division of Archaeology in 1990.

The study will be conducted in three phases: review of background sources, remote sensing survey, and data analyses and report preparation.

<u>Phase 1. Review of Background Sources.</u> Due to the availability of the study referenced in Section 2 above, this phase is limited to a brief review of pertinent information contained in the referenced CEI report, Chief of Engineers reports, and general histories of the parishes covering the project.

In addition to reviewing the cultural background of the project area, geological and sedimentological studies will be examined to develop a concise summary of the physical environment of the project areas. This investigation specifically will examine issues relating to wreck dispersion and preservation as well as channel changes.

<u>Phase 2a. Remote Sensing Survey.</u> Upon completion of Phase 1, the contractor shall proceed with execution of the fieldwork. The equipment array required for this survey effort is:

(1) a marine magnetometer;
(2) a differential GPS positioning system;
(3) a recording fathometer;
(4) a side scan sonar system.

The Contracting firm may propose additional equipment such as sub-bottom profiler and so forth as long as they can provide information in the technical proposal as to what kind of additional data would be obtained from its use. Three estimates must be provided if the contractor does not own the equipment to be used.

The following requirements apply to the survey:

(1) transect lane spacing will be no more than 100 feet;

(2) positioning control points will be obtained at least every 100 feet along transects;
(3) background noise will not exceed +/- 3 gammas;
(4) magnetic data will be recorded on 100 gamma scale;
(5) the magnetometer sensor will be towed a minimum of 2.5 times the length of the boat or projected in front of the survey vessel to avoid noise from the survey vessel;
(6) the survey will utilize the Louisiana Coordinate System.

<u>Phase 2b. Definition of Anomalies.</u> Additional, more tightly spaced transects will be conducted over all potentially significant anomalies to provide more detail on site configuration and complexity. Probing of the water bottom will be performed at all potentially significant anomalies where water depths and weather conditions permit.

<u>Phase 3: Data Analyses and Report Preparation.</u> All data will be analyzed using currently acceptable scientific methodology. The post-survey data analyses and report presentation will include as a minimum:

(1) Post-plots of survey transects, data points and bathymetry;
(2) same as above with magnetic data included;
(3) plan views of all potentially significant anomalies showing transects, data points, magnetic and depth contours;
(4) correlation of magnetic, sonar and fathometer data, where appropriate; and
(5) high quality reproduction of sonar records related to potentially significant anomalies.

The interpretation of identified magnetic anomalies will rely on expectations of the character (i.e. signature) of shipwreck magnetics derived from the available literature. Interpretation of anomalies will also consider probable post-depositional impacts, and the potential for natural and modern, i.e. insignificant sources of anomalies.

The report shall contain an inventory of all magnetic, sonar, and bathymetric anomalies recorded during the underwater survey, with recommendations for further identification and evaluation procedures when appropriate. These discussions must include justifications for the selection of specific targets for further evaluation. Equipment and methodology to be employed in evaluation studies must be discussed in detail.

A product to be provided under this delivery order and submitted with the draft reports will include CAD graphics and/or

design files compatible with the NOD Intergraph system. The maps and supporting files generated from marine survey data will show, at a minimum, the survey coverage area, the locations of all anomalies and other pertinent features such as: channel beacons and buoys, channel alignments, bridges, cables and pipeline crossings. Tables listing all magnetic anomalies recorded during the survey will accompany the maps. At a minimum, the tables will include the following information: Project Name; Survey Segment/Area; Magnetic Target Number; Gammas Intensity; Target Coordinates (Louisiana State Plane).

If determined necessary by the COR, the final report will not include detailed site location descriptions, state plane or UTM coordinates. The decision on whether to remove such data from the final report will be based upon the results of the survey. If removed from the final report, such data will be provided in a separate appendix. The analyses will be fully documented. Methodologies and assumptions employed will be explained and justified. Inferential statements and conclusions will be supported by statistics where possible. Additional requirements for the draft report are contained in Section 6 of this Scope of Services.

6. Reports.

Management Summary. Three copies of a brief management summary, which presents the results of the fieldwork, will be submitted to the COTR within 1 week of completion of the survey area. The report will include a brief summary of the historical research and field survey methods by waterway, as well as descriptions of each anomaly located during the survey. Recommendations for further identification and evaluation procedures will be provided if appropriate. A preliminary map will be included showing the locations of each anomaly. A summary table listing all anomalies will be included with the maps. The table will include the following information: Project Name; Survey Segment/Area; Magnetic target number; Gammas Intensity; Target Coordinates (Louisiana State Plane).

Draft and Final Reports (Phase 1-3). Four copies of the draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 20 weeks after work item award. The digitized project maps will also be submitted with the draft report.

The written report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8 1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 4 weeks after receipt of the draft reports (20 weeks after work item award). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 3 weeks (23 weeks after work item award). Upon approval of the preliminary final report by the COR, the Contractor will submit one reproducible master copy, one copy on floppy diskette, one copy on CD-ROM containing report in .pdf format, and 40 copies of the final report to the COR within 26 weeks after work item award.

APPENDIX II

RESUMES OF KEY PROJECT PERSONNEL

R. CHRISTOPHER GOODWIN, PH.D.
PRESIDENT & CEO

Dr. R. Christopher Goodwin, is President and Director of Research of R. Christopher Goodwin & Associates, Inc., a preservation planning, environmental management, and forensic sciences firm with offices in Frederick, Maryland, New Orleans, Louisiana, Tallahassee, Florida, and Birmingham, Alabama. A native of Maryland, he is a former Yale Peabody Museum Research Associate (1976), Arizona State University Fellow, and Smithsonian Institution (1979-1980) Research Fellow and Scholar-in-Residence. Dr. Goodwin holds degrees in Anthropology/Archeology from Tulane (B.A.), Florida State (M.S.), and Arizona State (Ph.D.) Universities; the latter institution named him a "College of Liberal Arts Leader," in 1997. He is an adjunct Professor in the Department of Anthropology at Florida State University.

Dr. Goodwin is recognized as one of the nation's leading experts in cultural resource management. He has been a contractor to the U.S. Army Corps of Engineers (Baltimore, Memphis, Nashville, New Orleans, Pittsburgh, Savannah, St. Louis, and Vicksburg Districts), to the Naval Facilities Engineering Command, and to the Department of Defense on numerous projects. During the past 19 years, he has served as Principal Investigator for major cultural resource investigations conducted by his firm in the Mid-Atlantic, Southeastern, Western, and Caribbean Regions. These projects have included such large-scale efforts as the architectural and archeological investigations at Baltimore's Oriole Park at Camden Yards stadium site; the new Baltimore Ravens Stadium; and the Washington Redskins' Jack Kent Cooke Stadium.

Dr. Goodwin's expertise also has been called upon for historic preservation planning projects, and for industrial and governmental agency compliance with federal and state laws and regulations governing archeological and historic sites. He has served as Principal Investigator on preservation and compliance projects for the National Capital, Southeast, and Southwest regions of the National Park Service (NPS); the Department of Energy (DOE); Her Majesty's Service, U.K.; the Louisiana Division of Archaeology; major utility companies, including Allegheny Power, ENRON, Texaco, Southern Natural Gas (SONAT), ANR/Coastal, Baltimore Gas and Electric Company, and Peabody Coal; the U.S. Fish and Wildlife Service, Northeast Region; the City of Annapolis; and, the Maryland Historical Trust. The geographic range of research and compliance projects completed under Goodwin's direction encompasses the Leeward Islands, Puerto Rico, the Bay Islands of Honduras, Maryland, Virginia, West Virginia, Pennsylvania, Ohio, Illinois, Arkansas, Florida, Georgia, Louisiana, Mississippi, California, and Texas.

Dr. Goodwin has published widely in the fields of prehistoric and historic archeology, and ethnohistory. His areas of particular expertise include preservation planning, cultural resource management, cultural ecology, prehistoric demography, field methods in archeology, human osteology, and historic archeology. He is a court-qualified expert in both historic archeology and in cultural resource management. In 1992, he was a recipient of the National Trust for Historic Preservation's National Preservation Honor Award for his work at Maryland's oldest surviving historic building, the Third Haven Meeting House, and of the Anne Arundel County Trust for Historic Preservation's Achievement in Archeology Award in 1992 and 1993. In 1997, he received the United States Small Business Administration's Administrators Award of Excellence, for "Outstanding Contribution and Service to the Nation," and the Maryland Historical Trust's Educational Excellence Award.

In addition to numerous technical reports and monographs, Dr. Goodwin has contributed to numerous scholarly journals, including *American Anthropologist, American Antiquity*, the *Florida Anthropologist*, and *American Scientist*. Dr. Goodwin is listed in *Who's Who in Leading American Executives* and *Who's Who Among Outstanding Americans*.

JEAN B. PELLETIER, M.A.
NAUTICAL ARCHAEOLOGIST/REMOTE SENSING SPECIALIST

Jean B. Pelletier, M.A., graduated from the University of Maine in 1991 with a Bachelors degree in Geological Sciences, and received a Master of Arts degree in History from the University of Maine in 1998. His research interests include maritime history and nautical archaeology, steamboat technology, industrial technology, remote sensing, geophysics, scientific diving technology, and underwater photography/videography. Mr. Pelletier has formal training in marine geophysics, marine and terrestrial remote sensing, remotely operated vehicles, underwater video and diving safety, and has conducted archaeological, archival, and geophysical investigations in Alabama, Connecticut, Delaware, District of Colombia, Florida, Georgia, Illinois, Louisiana, Maine, Maryland, Massachusetts, Mississippi, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, and Virginia. As a graduate student at the University of Maine, Mr. Pelletier worked with Dr. Warren C. Riess as a research assistant on the Penobscot Expedition Phase II, conducting remote sensing and underwater documentation of the ships of the Penobscot Expedition.

Before joining Goodwin and Associates Inc., in 1997, Mr. Pelletier served as an archeological and scientific diving consultant for several universities and public utility companies along the Atlantic seashore. In this capacity, Mr. Pelletier managed the recovery of nine cannons from the *Nottingham Galley*, an eighteenth century English merchant ship lost on the ledges of Boon Island, Maine.

Since joining Goodwin & Associates Inc., Mr. Pelletier has been involved in numerous Phase I, II, and III archaeological investigations of underwater sites. He has conducted remote sensing surveys in the Puerto Rico, Gulf of Mexico, Chesapeake Bay, and a Phase III recordation of the steamboat *Kentucky*, a confederate troop-transport lost on the Red River in 1865, near Shreveport, Louisiana. Mr. Pelletier's professional affiliations include: American Academy of Underwater Sciences, Marine Archaeology and Historical Research Institute (MAHRI), and the Society for Historical Archaeology.

Sarah A. Milstead Post
Nautical Archaeologist / Scientific Diver/ Assistant Conservator

Sarah Milstead Post graduated from the University of Texas at Austin in 1995 with a Bachelors degree in Archaeology. Mrs. Post will be receiving a Masters of Arts degree in Maritime History and Nautical Archaeology from East Carolina University in 2001. Her experience and education in nautical archaeology has led to interests in remote sensing, scientific diving, ship construction, maritime history, cultural resource management, and conservation. She has formal training in all of these areas and has been involved with projects in Texas, Louisiana, North Carolina, Virginia, Bermuda, Belize, and Maine. As an undergraduate, Ms. Post worked as an intern for Barto Arnold at the Texas Historical Commission (THC) dealing with all phases of underwater archaeology. She was also on the team of nautical archaeologists with the THC in 1995 that discovered the *La Belle Wreck* that dates to the seventeenth century.

Before joining Goodwin and Associates Inc. in 1999, Mrs. Post was a crew chief for field schools at East Carolina University while also finishing classes for her Masters degree. She has worked on many nineteenth century sites mapping, excavating, and conserving artifacts from shipwrecks. Since joining Goodwin & Associates Inc., Mrs. Post has conducted Phase I marine remote sensing surveys in Louisiana and Virginia, and Phase II underwater surveys dealing with historic and prehistoric surfaces in Louisiana, Alabama, Florida, Virginia, and Maryland. She has also conserved many land and underwater artifacts dating from the seventeenth century to the nineteenth century. Mrs. Post's professional affiliations include: the Society of Historical Archaeology and American Academy of Underwater Sciences.

Larkin A. Post, B.A.
Nautical Archeologist/Dive Safety Officer

Larkin A. Post graduated from the University of Maine in 1995 with a double major in anthropology and history. He attended the Maritime History and Nautical Archaeology program at East Carolina University (ECU). At that institution organized and led the largest student project in the program's history, for which work he should receive his M.A. in late 1999. Mr. Post is also a fully certified NAUI scuba instructor, ASHI first aid & CPR instructor, and American Red Cross Water Safety Instructor. As Goodwin and Associate's Dive Safety Officer (DSO) Mr. Post is responsible for all dive operations of the company and maintain Goodwin's status as currently the only private company that is a member of the prestigious American Academy of Underwater Sciences.

Mr. Post grew up working on the family's coastal Maine island and worked on local fishing boats from a young age. In spite of this he still retains a research interests in nautical archaeology, naval history and maritime industrial technology. Professional interests include remote sensing, navigation, remote piloted vehicle operation, and technical scuba diving. These skills have allowed Mr. Post to work on Phase I, II, III maritime archaeological projects in Maine, Massachusetts, Maryland, North Carolina, Bermuda, and Louisiana.

Before joining Goodwin and Associates, Mr. Post served as remote sensing and boat specialist for ECU. He also helped teach classes in remote sensing and was in charge of logistical setup and day to day operation several of the university's maritime projects. Finally for ECU he served as crew chief of the Castle Island, NC field school and as interim DSO for the project.

Carrie E. Sowden, B.S.
Nautical Archeologist II

Ms. Carrie Sowden received a Bachelor of Science degree from Emory University where she studied Chemistry with a minor in History. She held an internship at the University of Maine, Darling Marine Center as an historical / archaeological intern. While there she started and maintained artifacts for conservation from an underwater site as well as participated in phase II project for the *Angel Gabrial*. She is an Advanced SCUBA diver with Divemaster training.

Since joining R. Christopher Goodwin & Associates, Inc. in January, 2000, Ms. Sowden has been involved with marine artifact conservation and nautical data analysis.